



FRIDAY, OCT. 24.

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Contributions.

The Pullman Sash Balance.

ROCHESTER, N. Y., Oct. 17, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Can we trouble you to correct a rather serious error in the item about our balance, on page 697, of your issue of Oct. 10?

You say that the drum of our balance is 1 in. thick, when, in all ordinary sizes of the car window balances, it is not to exceed five-eighths of an inch thick. This may seem like a very small difference, but one of our strong points is the small space occupied in the window post by our balances, and a difference of three-eighths of an inch in width might decide the case, in the mind of some inquirer, against us.

Another small discrepancy appears in the notice above referred to—i. e., the available part of the suspending ribbon is never longer than 18 ins., unless especially so ordered.

PULLMAN SASH BALANCE CO.

[The error was in proof-reading. The drum of the balance from which our description was made is $\frac{5}{8}$ in. thick, and the thickness of the case over all is $\frac{3}{4}$ in.—EDITOR RAILROAD GAZETTE.]

Automatic Block Signals in New England.

NEW YORK, Oct. 18, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

We note in the *Railroad Gazette* of the 17th inst., under the head of "New England Notes," the following statements: "Automatic electric signals were noticed on more than one road which failed to go to danger when the train passed them"; also that "The Hall automatic block signals are now quite numerous on the Hartford Division of the New York, New Haven & Hartford, and more are being put in, apparently with the intention of equipping long stretches of road with continuous blocks. The erection of both Hall and Union electric signals on the Boston & Albany is going on at several points, and the equipment of the 98 miles between Boston and Springfield is intended to be completed the present year." We would esteem it an act of justice to all interests concerned if you would inform us if any Hall signals "failed to go to danger when the train passed them."

WILLIAM P. HALL, President.

[No cases were observed in which the Hall signal failed to go to danger. The reader must mark this point, however: the writer of the notes did not attempt to attribute the failures to their proper source. He could not see whether they were or were not properly maintained. It is pretty safe to assume that they were not.—EDITOR RAILROAD GAZETTE.]

Camber of Bridges.

Central New England & Western Railroad Co.,
Poughkeepsie Bridge Route,
HARTFORD, Conn., Sept. 29, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Noticing the article on this subject by Mr. Cooper in the *Railroad Gazette* of Sept. 23, I send you herewith a copy of specifications of the New York, New Haven & Hartford, which contains the formula for camber and deflection, which are original with me, and, so far as I know, have not been used by any one else.

I am at present not engaged in designing bridges or other work, but as long as you have the subject up I offer this matter for what it may be worth.

The notation and reasoning of the formula are from Stoney's work on strains, if my memory serves me correctly.

For ordinary railroad spans I find that these formula work very well.

Camber.—All structures shall be designed to show a camber, a true arc of a circle, when supporting fixed load of bridge only.

$$C = \frac{s^2 (c + t)}{10,000,000d}$$

C = camber in inches at centre of span.

s = length of span in feet.

d = effective depth of girder in feet.

c = unit stress, compression per square inch from variable load.

t = unit stress, tension per square inch from variable load.

Deflection.—When a train of the specified load is passed over the bridge at the usual train velocities, or when the load is allowed to remain static 12 hours, and removed, or both, the maximum deflection shall not exceed $s^2 (c + t)$, values as before, after which the structure must return to its original condition.

S. B. OPDYKE, JR.,

General Superintendent.

The Engine Brake in Relation to Shock.

LYNCHBURG, Va., Oct. 20, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Upon more than one occasion when writing on the above subject I have made the assertion that if an engine is equipped with a full-powered brake—i. e., one that gives a brake shoe pressure of 80 per cent. of the wheel weight—and the cars are given an equal percentage of brake shoe pressure, that there would be no shock. I am fully aware of the importance of handling the brake properly, even if the percentages are perfect; but the above are the conditions for the successful elimination of shock, and I have just witnessed a very interesting demonstration of the truth of this statement. For some time past preparations have been in progress on the Lynchburg & Durham Railroad, Virginia, for a test of the Loughridge air brake upon freight cars. Mr. Loughridge himself holds the same theory with regard to shock as that mentioned above, consequently he was anxious to get an engine brake that could utilize 80 per cent. of the wheel weight of the engine; he therefore selected the Beals engine brake as the only one that could give him this percentage upon every wheel.

The engine, a Baldwin ten-wheeler, was so equipped, and a train of heavily loaded freight cars having the link-and-pin coupler with plenty of free slack was attached. The speed was 32 miles per hour on an 80 foot down grade, and the stop was made in a distance of 560 ft., without shock. This experiment was repeated three times with like results.

The train was then run upon a 62-ft. down grade; on the centre of the grade was placed a detonating signal, the explosion of which by the engine called for an emergency stop. The speed was that of an ordinary freight train, viz.: 20 miles per hour. The time of the stop was taken from the moment of the explosion and was 15 seconds, and the distance was 480 ft. This was repeated three times, and each time there was no shock.

For those of your readers who are not familiar with the Loughridge air brake, allow me to say it is an eminently simple affair. There is but one casting, embodying two cylinders placed end to end, one being 6 in. in diameter and the other 9½ in.; one three-way cock, which carries air to either one or both of the cylinders (according to the load of the car). The small cylinder is used when the car is empty and the large cylinder when the car is loaded, or both large and small may be used simultaneously if the load is extreme. There is no auxiliary reservoir, no triple or other valve, and the whole brake is manipulated with an ordinary three-way cock upon the engine. The pressure is stored in a single reservoir, which in this case carried 100 lbs. of pressure to the square inch. The brake is so devoid of complication that it can be understood by anyone in half an hour; the hand brake is not interfered with, and when applied does not drag out the brake pistons. Mr. Loughridge has a separate attachment for applying brakes should the train break in two. The interchangeability with the Westinghouse air brake was illustrated in this test, as a Westinghouse equipment was worked in connection with it upon the tender. Altogether it is the most simple and practical air brake for freight cars upon the market, and was so pronounced by the gentlemen present, including the officers of the road, who were so satisfied with it that they adopted the system for their freight cars.

JAS. HOWARD.

[This brake was illustrated and described in the *Railroad Gazette* Aug. 26, 1889, in its essential features. A few changes have been made since.—EDITOR RAILROAD GAZETTE.]

Engineering in Oregon.

The change of gauge of the Oregonian Railroad and the reduction of grades and curves have been the subject of several articles published in our construction columns this year; and the litigation which preceded the sale of the ownership to the Southern Pacific, which was confirmed by the United States Courts last April, has also been explained.

The lines had been in control of a Receiver since the Oregon Railway & Navigation Co. surrendered its lease, Nov. 15, 1884, when they were purchased by the Southern Pacific about July, 1889. Possession was taken in April, 1890, by the Oregonian Railroad Co., which was organized by the new owners. Extensions were decided upon from Coburg south to Jasper, Ore., on the southern end of the line, and on the northern end from East Portland to Silverton. The following account of the new work is written by one of the Assistant Engineers on the work:

The new owners began the work of widening the excavations and embankments of the existing narrow (3 ft.) gauge track on the branch on the east side of the Willamette River to standard gauge. The west side branch is to be left a narrow gauge, to use up the existing rolling stock on; though it is to be brought up to proper standard with regard to gradients and alignment. The east side branch, which at present extends from Ray's Landing on the Willamette River, opposite Dundee Junction, south to Coburg in the southern part of the state, 90 miles, is, after the widening of the gauge, to be extended southward. It is also to have a direct connection with East Portland by a projected line, which branches off at Silverton (where the existing line makes a sharp bend), running, roughly speaking, northeasterly, crossing Butte Creek and Rock Creek, to Molalla. It then continues, with probably more of a trend to the north, crossing Molalla and Milk Creeks, to some point on Cedar Creek, a affluent of the Clackamas River, and down that creek, crossing the Clackamas River, and following it on the north bank for 1½ miles to the west; then up Rock Creek to its source. The line then descends Kelly Creek to Johnson's Creek (also called Milwaukee Creek), and descends the latter to the neighborhood of Lent's post office. From here it goes in a fairly direct line toward the station "Car Shops" of the Oregon & California road (Southern Pacific).

My own share in this work consists in: 1. Making examination and report on the condition of all structures between Woodburn and Crabtree stations. 2. Making a small part of the location between Silverton and Molalla and setting a construction force to work. 3. Ascertaining whether the existing line over the Waldo Hills can be changed from a two per cent. uncompensated gradient to a one per cent. compensated one. 4. Making the location from Lent's post office to the summit between Kelly and Rock creeks. 5. Making the location from the same summit to the crossing (including) of the Clackamas River.

The conditions imposed by Mr. Huntington on the engineers' department were that, if at all possible, no gradient steeper than one per cent. should be used, nor any curve sharper than 10 degrees. The compensating is done by the sliding scale (increasing compensation per degree as the curve becomes sharper), devised by Mr. William Hood, Chief Engineer of the Southern Pacific. Transition curves (tapers) are used, according to the tables of Mr. Hood, and generally the rules and regulations of the Southern Pacific service, regarding methods, accuracy, etc., are governing here, as far as they can be applied in a country as densely covered, as foggy, rainy and smoky as this is.

The country so far traversed by me has the general character of a high plateau of several benches, rising here and there in isolated buttes and ridges. The drainage ways are deeply sunk below the general surface; usually at the bottom of wide, valley-like depressions. Of true cañons (slopes rapidly getting steeper toward the bottom) I have encountered but one. The soil is generally a hard clayey loam, mixed with varying percentages of gravel and cobbles, frequently underlain by beds of pure gravel and cobbles, which also come to the surface at points. Solid rock appears in a few spots only. The farms and settlements are on the plateaus and ridges. If the country were an open one, the locating of a railroad line through it would offer no particular difficulty; would, in fact, be rather easy than the reverse. As it is, nearly every foot of the ground on which such a line must fall is covered with forest. This forest has nearly all been cut by the lumbermen, and masses of logs, branches and rubbish been left lying in all directions and the storms have pulled up numbers of fir trees by the roots. These firs have no tap-roots, but present, when thrown down, a disc-like mass of interlaced roots, inclosing earth and cobbles, 2 to 4 ft. thick and 6 to 12 ft. in diameter, on which it is rarely possible to set up an instrument and which cannot be tunneled through short of the use of explosives. Finally all of the ground not actually occupied by trees, standing or fallen, is covered by the densest tangled underbrush. In a few small patches some approach to virgin forest was also met, and here progress was comparatively easy, there being little underbrush and but few fallen trees and logs. It is climbing over these and setting up instruments on them which causes running half a mile line per day to involve more exertion and wear and tear than four miles on open ground.

Among the minor afflictions of this part of Oregon must be mentioned the roads, covered with corduroy—split timbers of every degree of angularity—and the wasps, against whose nests in the forest one is constantly running. Once we found three in a length of 100 ft. One nest is easily competent to disorganize the whole party.

I am authorized by Mr. Lewis Tasheira, Chief Engineer

Oregonian Railroad Co., to state that there are now three construction parties in the field, one on the west side, one on the east side and one on the Coburg extension. On this extension contracts for grading eight miles have been let to F. B. Staples & Co. The contracts for a bridge across the McKenzie River, involving two spans of 60 ft. and one span of 250 ft., have been let to Hoffman & Bates, of Portland.

There is, besides mine, one more locating party in the field, in charge of Mr. Robinson, Assistant Engineer Oregonian Railroad Co., operating, as far as I understand, between Silverton and that point above mentioned, where the line, as projected, reaches Clear Creek. Mr. Robinson seems to have encountered much more difficult ground than I have. For three days his instruments never touched the soil, being on logs and fallen trees all the time.

Some Unconsidered Elements in the Action of Brakes.

BY R. A. PARKE.

The attention of the writer has several times been called, by railroad officers, to the inability of the air brake to stop particular trains on particular occasions, within what was considered a reasonable distance. These complaints have generally followed an accident of some kind, and the circumstances are generally surrounded by sufficient uncertainty to make it seem very doubtful if the air brake did its work properly.

It must be generally admitted that the evidence given, as to the time and place at which the brakes were applied, and the speed at which the train was running, is usually not quite trustworthy, as the elements of excitement and uncertainty, in an impending accident, permit the imagination to materially affect the judgment. Generally, however, an investigation of such cases as are indisputably shown to have involved an inefficient action of the brakes, brings to light the fact that the proportions of the levers, under several cars of the train, were such as to give a braking force far below that, which should be realized in case of an emergency.

Beyond all this, however, where the braking force for each vehicle has been properly calculated and applied in the manner generally considered correct, there is still room for considerable variation in the stopping efficiency of the brakes upon the cars, on account of unconsidered influences upon the braking force, due to the mechanical arrangement of the brakes themselves. It is the purpose of this communication to point out some of these influences, to show the extent of such influences and the way to avoid evil results from them.

In nearly all cases the forces acting upon the brake levers and through the brake lever upon the brake beam are all horizontal. It is generally customary to apply a maximum braking force to each brake beam equal to 90 per cent. of the weight which one pair of wheels brings upon the rail; this force is almost invariably horizontal, and is supposed to produce a pressure between the brake shoe and wheel equal to such horizontal force. That this supposition is, in most cases, an error, and in many cases a very considerable error, is demonstrated below.

For the purpose of giving a practical illustration, with actual forces employed, two cars weighing about the same, constructed alike in all essential parts, but having the brake beams hung in different ways, have been selected, and the figures below represent the actual working conditions. The cars weigh about 51,000 lbs., and the weight brought by each pair of wheels upon the rails is about 12,750 lbs. The maximum braking force should, therefore, be about 11,500 lbs. upon each pair of wheels. The brake levers actually do bring a force of 11,500 lbs. horizontally upon each brake beam.

Fig. 1 represents one style of hanging a brake beam, the line $m n$ showing the position of the hanger. Fig. 2 represents the other style of hanging, $m n$ showing the position of the hanger. The line $a b$, taken at a convenient scale, represents a horizontal force of 11,500 lbs., in each case, acting upon the brake beam. The point a , in the line of this force, being taken at the intersection of that line with the line of direction of the hanger $m n$, produced, the force $a b$ is broken up into two forces, one being radial to the wheel, or $a c$, and the other in the direction of the hanger, or $a d$.

Thus the force which is utilized for the braking force is not the horizontal force $a b$, but a force $a c$, radial to the wheel through the intersection of the line of force $a b$ with the line of direction of the hanger $m n$; and it will be observed that the line of direction of the hanger $m n$ has a very considerable influence, both upon the amount of the force $a c$ and also upon the direction of that force through determining the position of the point a . In the particular cases, shown in fig. 1 and fig. 2 (the horizontal force $a b$ being in each case 11,500 lbs.), the amount of braking force $a c$ upon a pair of wheels, shown in fig. 1, is 11,900 lbs., while, in fig. 2, the amount of this force $a c$ is but 10,730 lbs.—a very considerable discrepancy.

There is, however, another influence acting upon the amount and direction of the braking force, upon which the angularity of the hanger has a considerable influence. Having determined the force $a c$, as already described, there is now a frictional force between the surface of the wheel and the shoe, at the point r , on the circumference of the wheel, equal to about one-fifth of the force $a c$. If the wheel is moving in one direction, this frictional force will act upon the shoe in one direc-

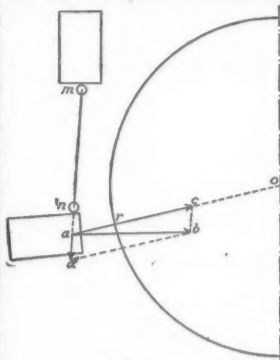


Fig. 1.

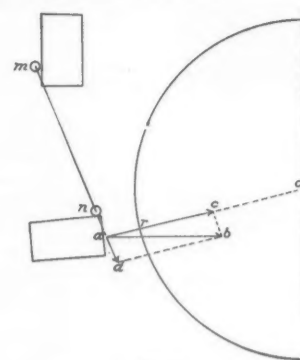


Fig. 2.

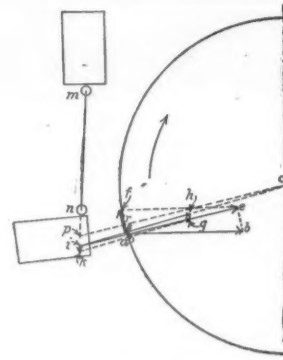


Fig. 3.

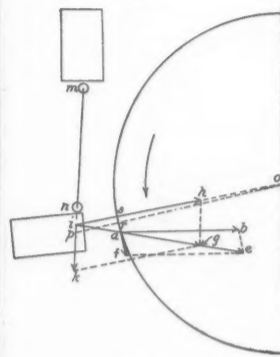


Fig. 4.

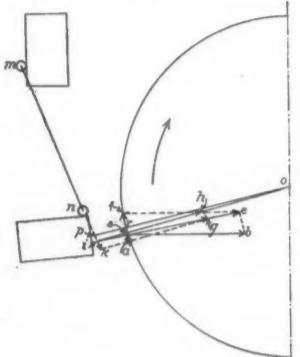


Fig. 5.

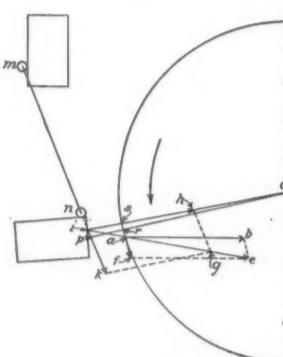


Fig. 6.

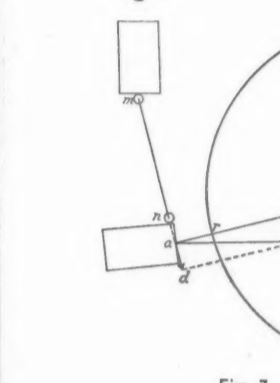


Fig. 7.

SOME UNCONSIDERED ELEMENTS IN THE ACTION OF BRAKES.

Taking, now, the case of the arrangement represented in fig. 2, and applying the frictional force, 2,150 lbs., in figs. 5 and 6, by the same method, we find, in fig. 5, a braking force $i h$, equal to 11,050 lbs., and in fig. 6 a braking force $i h$, equal to 10,420 lbs.

It will thus be seen that, with these two methods of hanging the brake beam, the same horizontal braking force of 11,500 lbs. produces upon the two pairs of wheels of the trucks of the two different cars, four different actual braking forces, varying from 10,420 lbs. as a minimum to 12,420 lbs. as a maximum. It is supposed that the braking force applied to each pair of wheels is 11,500 lbs., or 90 per cent. of the weight brought upon the rails by a pair of wheels; whereas, in one case it is as low as 10,420 lbs., or 81.5 per cent. of the weight, and in the other case 12,420 lbs., or 97.2 per cent. of the weight.

This will go far toward explaining the sliding of wheels with the application of what is supposed to be a moderate braking force. Of course, if the motion of the car were reversed, the braking forces, found for the two pairs of wheels of the truck, would be reversed; and if a force of 97.2 per cent. of the weight were applied to one pair of wheels moving in one direction, and to the other pair of wheels when moving in the opposite direction, the chances are very favorable for all the wheels to become flattened.

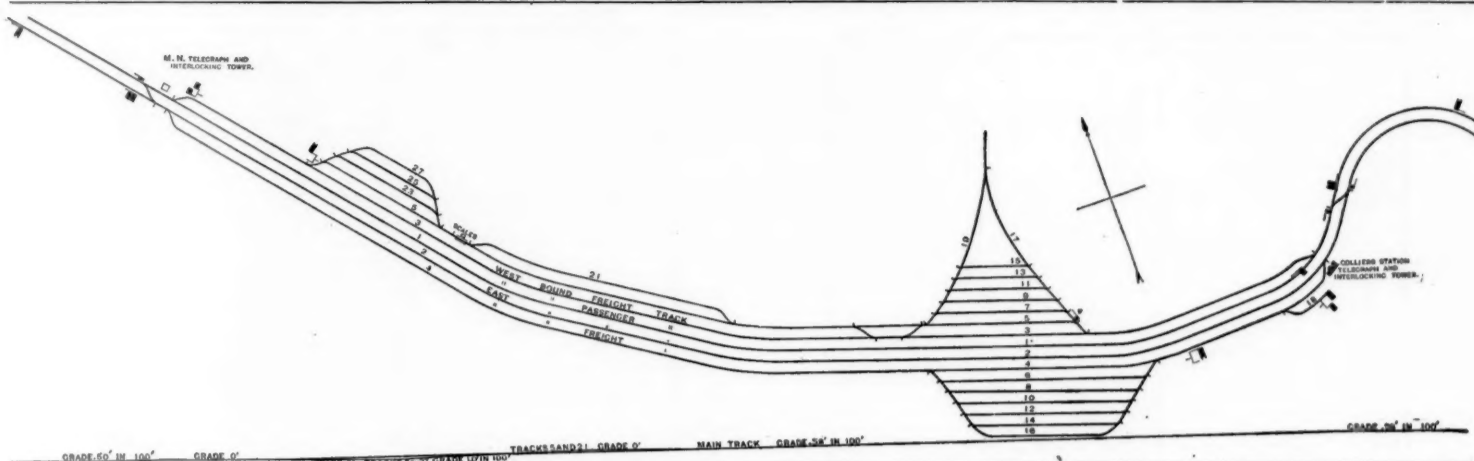
Nor is this all. Adding together the braking forces brought upon all the wheels of the car, shown in figs. 3 and 4, the total braking force upon the car is 47,620 lbs., and that of the car, shown in figs. 5 and 6, is 42,940 lbs. Each is supposed to have a braking force of 46,000 lbs. As a matter of fact the car with the arrangement shown in figs. 5 and 6 would run about 11 per cent. farther, in an emergency stop, than the car having the arrangement shown in figs. 3 and 4.

These arrangements of the hangers, shown in figs. 1 and 2, are by no means extreme, but are such as are frequently found in practice upon railroads. There are many cases where the actual braking force brought upon a pair of wheels will vary more considerably from the calculated horizontal forces applied to the brake beam than shown here; and it will be readily seen that two serious evils arise in such cases; one being that the cars have not the stopping efficiency calculated for them, and the other being that, while the braking force upon the wheels is much less than it ought to be when the wheels revolve in one direction, they will have a braking force very apt to cause them to slide and flatten when running in the other direction.

The writer fully appreciates the undesirability of going into all the calculations above shown when designing the brake gear for a car, and he desires to point out a simple method of obviating the necessity for so doing. It will be observed that, in fig. 1, the direction of the hanger $m n$ forms, with the radial line $a o$, an acute angle, while in fig. 2 the angle between the line of the hanger $m n$ and the radial line $a o$ is obtuse. It will also be observed that, in fig. 3, the braking force is less than that in fig. 4, while the braking force in fig. 5 is greater than that in fig. 6. If the direction of the hanger $m n$ were perpendicular to the radial line $a o$, the variation of the actual braking forces, with the different directions of rotation of the wheel, would be a minimum.

If, therefore, in designing the brake gear for a truck, a thickness of the shoe intermediate between it³

³It should be remarked here that these figures are only approximately true. A closer approximation may now be obtained by applying the new frictional force, 2,280 lbs.—one-fifth of 11,360 lbs., the brake pressure found—in a line tangent to the wheel at the point a , in fig. 3, and the new frictional force, 2,480 lbs.—one-fifth of 12,400—in a line tangent to the wheel at a , in fig. 4, and combining these forces with the horizontal force, 11,500 lbs., and again new and closer values of the actual radial braking forces. The same is true in the cases of figs. 5 and 6. But the changes in the results would be so slight that the figures of the first approximations are retained throughout the discussion.



Plan and Profile.

COLLIERS YARD—PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY.

NOTE.—The plan as shown here is, of course, much distorted. Two scales are used, and they are approximately: Longitudinal scale, 1" = 1,420'; transverse scale, 1" = 183'.

thickness when new and when worn out, be selected as an average thickness of the shoe, and a direction is given to the hanger, perpendicular to the radial line of application of the braking force, the irregularities may be reduced to a minimum. Where steel-tired wheels are used, the average diameter (midway between that of the new wheel and that when worn down) should be selected, and a shoe of average thickness applied to it, to determine the position of the point m for finding the line $m n$. It may be observed here that the shape of the hanger, whether straight or curved, has no bearing upon the question, as a straight line drawn between the points of support m and n is the line of actual stress upon the hanger.

Another matter of some importance, connected with this question, is the point upon the periphery of the wheel, at which the pressure is applied. In figs. 1 and 2 it is shown to be at the point r , where the circumference cuts the line $a o$, and, in figs. 3, 4, 5 and 6, this point is at s , on the line $o p$. It will be observed, however, that the actual point of application of the braking force with the wheels moving in different directions is different in each case, being always on the line $a o$ in figs. 3, 4, 5 and 6.

If the recommendation be carried out to make the direction of the hanger perpendicular to the line $a o$, the variations of this point of application of the braking force upon the wheel, from point r (fig. 7), will be reduced to a minimum; it will be on one side of that point when the wheel is moving in one direction, and on the other side of it when the wheel is moving in the opposite direction.

Therefore, the point r , at which the line $a o$ cuts the circumference of the wheel (fig. 7), should be selected as a centre point of the shoe; whatever the length of the shoe, it should be so placed that its central point comes in this position; otherwise the shoe will wear more rapidly upon one end than upon the other, and the full service of the shoe will not be obtained.

In designing a brake gear to obtain the proper results, the following method should therefore be adopted.

In fig. 7 the diameter of the wheel is taken as the average. The position of the point m is chosen for the average thickness of the brake shoe. The line $a b$ represents the direction of the horizontal pull through the pin of the clevis on the brake beam. Through the centre of the wheel o and the point m (being the centre of the pin suspending the brake head) draw two lines meeting at a right angle on the line $a b$ at some point a . The line $a n$, produced will be the proper direction of the hanger, determining the position of the point m and the length $m n$ of the hanger. The line $a o$ gives the direction of the braking force applied to the wheel, and the point r , at which it cuts the circumference, will be the position of the centre of the shoe. On the line $a o$ lay off to any convenient scale a distance $a c$, equal to 90 per cent. of the weight brought by the pair of wheels upon the rails for passenger cars (in the present example 11,500 lbs.) and 70 per cent. for freight cars. Through the point c draw, parallel to $m n$ (that is, perpendicular to the line $a o$), a line which will cut the horizontal line $a b$ in some point b . The length of the line $a b$, to the scale chosen in laying off $a c$, will be the horizontal force, which must be applied through the brake lever to the brake beam to produce the braking force required. In the example it is 11,800 lbs.

By combining with this horizontal force of 11,800 lbs. the frictional force, 2,300 lbs. (one-fifth of 11,500 lbs.), for each direction of motion of the wheel, the actual braking forces are found to be identical, or 11,502 lbs. in either case. Moreover, the point of application of the braking pressure is $\frac{9}{16}$ in. below the point r when the wheel has a right-handed motion, and $\frac{1}{16}$ in. above the point r when the wheel has the opposite motion; and, as the wheels of a car run about as much in one direction as the other, the shoes will wear evenly.

It is necessary to observe that, as the angles which

the lines $a o$ and $m n$ make with the horizontal line $a b$, depend upon the distance of the line $a b$ below the centre of the wheel o (especially in the case of driver brakes upon locomotives, where the diameter of the driving wheel varies in different classes of engines, while the distance of the brake shoes above the rails remains about the same), the angularity of the hangers will vary; therefore it must not be assumed that, having determined the angle of the hanger for a certain style or class of vehicle, the same angle will do for other classes.

The distance of the point of application of the braking force from the point r in all cases depends upon the distance $a r$ of the hanger line from the wheel, and this distance should therefore be made no greater than is necessary. In the case of driver brakes upon road engines, where the wheels turn in one direction most of the time, the centre of the shoe should be placed at or near the point where the line of actual braking force comes upon the wheel to insure even wearing of the shoe.

NEW YORK, Oct. 8, 1890.

The Colliers Yard of the Pittsburgh, Cincinnati, Chicago & St. Louis Railway.

The yard which is shown here has been completed and put in service within the last year. It will be seen that it is a yard of considerable capacity and very carefully planned. The track in the yard tracks only, exclusive of the four through tracks, is over 25,000 ft. Our illustration is necessarily distorted, as two scales had to be used in order to get the engraving within reasonable limits, and at the same time show the tracks clearly. The scale longitudinally is about 1,420 ft. per inch, and transversely about 183 ft. per inch, the drawing having been photographed down arbitrarily to fit the page.

The distance from Colliers station to $M N$ tower, that is, from the beginning to the end of the four track arrangement, is 2.2 miles. The yard was built at Colliers on account of the break in the grade of the road in that place necessitating the rearrangement of trains and handling a large number of cars. West of Colliers the same engine will haul about 45 per cent. more cars than it hauls east of that place; consequently, every eastbound train sets off about half its cars at Colliers. Every third westbound engine leaves all of its cars at Colliers, is run into the eastbound yard and takes a train east. Every westbound engine that runs through picks up an additional load of about half as many cars as it brings into Colliers. There is very little local business done at this point, and few cars change their direction here. Therefore it is practicable to entirely separate the eastbound and westbound cars; and in order to avoid crossing the passenger tracks with freight trains, which is necessary when both the east and west bound yards are on one side of the main tracks, the passenger tracks in this case are put through the middle of the yard, the westbound yard being on the north and the eastbound on the south of the main tracks.

From Colliers station to $M N$ tower are four tracks, two passenger and two freight. All the tracks for westbound business are numbered with uneven numbers, those for eastbound business with even numbers, corresponding with the system adopted in numbering trains. The through tracks are used as follows: No. 1, westbound passenger; No. 2, westbound freight; No. 2, eastbound passenger; No. 4, eastbound freight.

All coal for the Cleveland & Pittsburgh road, for the lakes, for the New Cumberland Branch, for the Pittsburgh, Wheeling & Kentucky Branch and for shipment west is set off at this point for weighing, and the billing is done from the scales. Track No. 5 from its east end to the scales is used as a receiving track for coal.

Other westbound cars set off at this point are drilled as they are set off, as follows: Tracks Nos. 7 and 9, miscellaneous; No. 11, Pittsburgh, Wheeling & Kentucky; No. 13, New Cumberland Branch; No. 15, cars for local points west. The cars are picked up by westbound trains in the order of their relative importance, except

local cars, which are held for the local freights. The cars of coal are dropped from the main yard down track 5 to the scales, where, after being weighed, they are distributed as follows: No. 5, Cleveland & Pittsburgh lake coal; No. 23, Cleveland & Pittsburgh local coal; No. 25, coal for Company's use; No. 27, local Pittsburgh, Wheeling & Kentucky and New Cumberland Branch coal.

In the eastbound yard trains set off their overloads and sort them as follows: Tracks Nos. 6 and 8, mine empties; No. 10, Pittsburgh, Virginia & Charleston; No. 12, Pittsburgh bulk cars; No. 14, cars for Pittsburgh transfer; No. 16, cars for local points east. Track No. 18 is used for cars to be loaded or unloaded at Colliers.

At each end of the yard is an interlocking tower and the passenger tracks are absolutely unbroken from one end of the yard to the other. Freight trains running on tracks Nos. 3 and 4 are not required to flag, which gives them all their men to do the shifting and greatly expedites their business. By the arrangement also freight trains can at all times do their work without clearing the track for the passenger trains. There are some trains, notably those loaded with stock, fresh meat, and other perishable freight, which have no work to do at Colliers, and, if no passenger train is in the neighborhood, they are run over the passenger tracks, giving them an opportunity to pass around slower trains and entirely saving delay from the yard work.

Westbound engines which are to go east from Colliers turn their engines on the Y-tracks, Nos. 17 and 19 and in order to get to Colliers station to cross over to the eastbound tracks they have to run from the east ladder of the westbound yard in the reverse direction on the westbound freight track No. 3. This movement is made in accordance with permission given by the dwarf signal No. 4, which will be seen at the end of track 5. This ladder is not in view of the tower, and at No. 4 signal there is provided a little box put at a convenient height on a post. In the box is a key-hole into which a switch key only can be inserted. One turn of this key rings an annunciator in the Colliers tower, and if No. 3 track is clear a signal is given to the engine and it uses this track, westbound trains being held by the home signals at the interlocking. In order to run in the reverse direction on track No. 4 a flagman is left at the east ladder of the eastbound yard to protect the engine as it returns.

For the drawing of this yard and the notes describing it we are indebted to Mr. J. J. Turner, Superintendent Pittsburgh, Cincinnati, Chicago & St. Louis Railway.

Train Resistance and the Propelling Force of Locomotives.

The following diagrams are taken from Godwin's "Railroad Engineer's Field Book," a review of which appeared in a late issue of the *Railroad Gazette*.

Diagram I. contains the curves of resistance in pounds per ton arising from rolling friction, the atmosphere, oscillation and concussion, curvature and grade, for speeds varying from zero to 70 miles per hour. These curves explain themselves, and will not be dwelt on here at length. They form a part of the discussion of the conditions affecting a railroad location, given in the first part of Mr. Godwin's book. Concerning his determination of the resistances we shall have something to say later, as we do not agree with all of his premises or deductions.

Diagram II., showing the propelling force of a locomotive of 500 I. H. P., is given as an illustrative example of a method of discussing problems in propulsion, starting and stopping, which seems to be new and very neat. The propelling force of the locomotive is constant, and measured by the tractive cohesion of the drivers on the rails, until the speed is reached at which the full steaming capacity of the engine is attained, or until it has developed its full horse power. From here on, as the velocity increases the propelling force diminishes, as shown by the curve of propelling force in this diagram. The broken line tangent to this curve gives the propell-

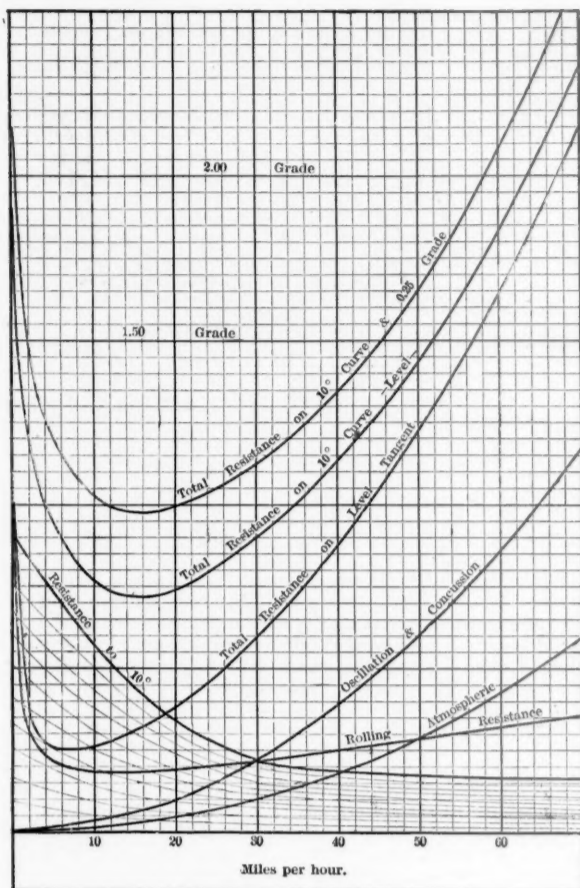


DIAGRAM I.

TRAIN RESISTANCES IN LBS. PER TON.

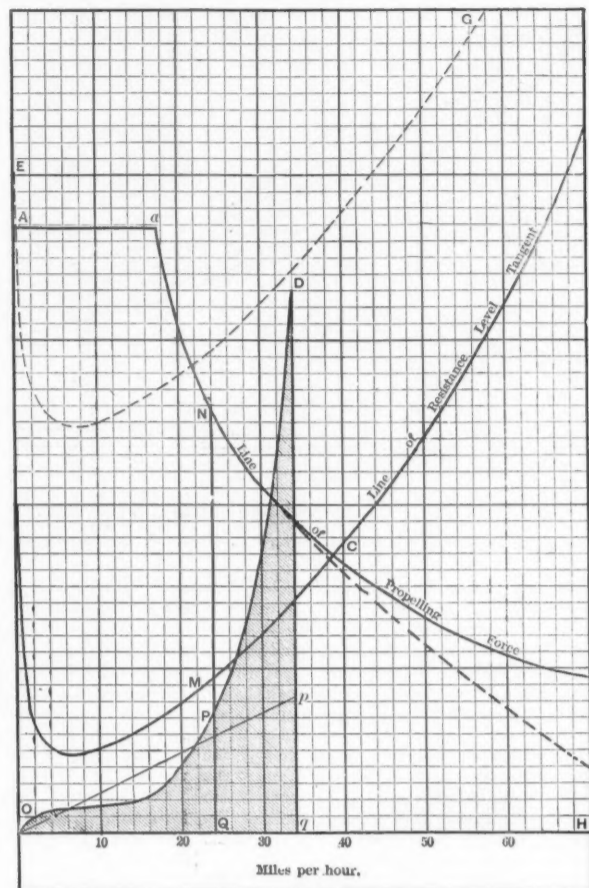
Engine and Tender weigh 60 tons. 10 Loaded Box-Cars, each weighing 20 tons.
SCALE: 1 inch vert. = 10 lbs.

DIAGRAM II.

PROPELLING FORCE OF LOCOMOTIVE IN LBS. PER TON.

Locomotive 500 I. H. P.
Engine and Tender = 60 tons.
10 Cars, 20 tons each.
f = 0.2
SCALE: 1 inch vert. = 10 lbs.

ing force available for drawing the train load, the portion between the full and broken line being consumed by internal resistances.

The line of total resistances for a particular train on a level tangent is also drawn on this diagram. For all speeds below 38 miles per hour the propelling force is in excess, but beyond that speed the resistance is in excess. This is the limiting speed, therefore, for this engine and train on a level tangent, toward which the speed may approximate but can never reach. Below this speed the excess of propelling force over resistance is wholly spent in overcoming the inertia of the train and in increasing its velocity.

The shaded area in this diagram represents the distance traversed by a train while accelerating its velocity from one speed to another. Thus the total area represents the distance traversed in acquiring a speed of 34 miles per hour, and any part of this area limited by vertical ordinates indicates the distance traversed in changing the speed from that represented by one ordinate to that denoted by the other. That is, the area between the 20-mile and the 34-mile ordinate, when properly evaluated, indicates the distance traversed in accelerating the speed from 20 to 34 miles per hour. This curve is constructed by plotting the ordinates, as PQ , of such a length as equals the ratio of the lines OQ in the figure, these lines being measured in inches on the diagram, and plotted to the vertical scale of the diagram. Then one square inch on the diagram represents one linear mile, provided one inch horizontally represents 20 miles per hour and one inch vertically represents 10 pounds.

To prove this we have*:

$$F = M \frac{dv}{dt} = M \frac{v}{ds} \frac{dv}{ds}$$

where F = accelerating force.

$$M = \text{mass} = \frac{W}{g}$$

v = velocity in feet per second.
 s = feet.

$$\text{or } ds = M \frac{v}{F} dv.$$

whence

$$s = M \int_F^v dv = \frac{W}{g} \int_F^v \frac{v}{F} dv \quad (1)$$

where the units are in feet, seconds and pounds. To write this equation in miles, hours and tons we have, since the weight here considered is one ton,
 $W = 1.$

$$g = 32 \text{ ft. per second} = \frac{(3,600)^2}{5,280} \text{ miles per hour.}$$

* This demonstration is thought to be some improvement on that given by the author in his appendix.

$r = 20 (OQ)$ as taken from diagram.

$$F = \frac{10 (MN)}{2,000} \text{ " " " "}$$

whence $dv = 20 d(OQ)$; and therefore

$$\begin{aligned} s \text{ (in miles)} &= \frac{5,280 \times 20 \times 2,000}{32 \times (3,600)^2 \times 10} \int_Q^{Q'} \frac{OQ}{MN} d(OQ) \\ &= \frac{55}{54} \times \text{area included between the ordinates} \\ &\quad Q \text{ and } Q' \text{ wherever they may be taken.} \end{aligned}$$

If we call $\frac{55}{54} = 1$, then we may say that the area of this curve in square inches, included between the ordinates at any two velocities, represents the distance run in miles, while accelerating the speed from one velocity to the other.

The straight line Op represents by the area below it the distance traveled on the supposition that the propelling force is constant, which is the ordinary supposition.

Yarrington's Train-Order Signal.

The engravings shown herewith give a front and a side view of the train order signal used on the Newport News and Mississippi Valley road. It was patented by

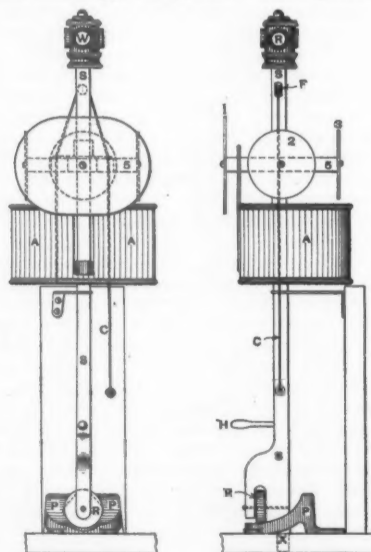


Fig. 1.

Fig. 2.

Yarrington's Train-Order Signal.

Messrs. J. D. Yarrington and H. D. Shanklin, and is now controlled by the former. The signal consists essentially of four discs, three red and one white, facing the

four points of the compass, and attached to the ends of horizontal arms fastened to the upper end of a vertical iron rod made of 1-in. gas pipe (S, fig. 1 and fig. 2). Fig. 1 shows the signal as it appears to the operator, who sits facing the track, the oval disc, which is the white one, showing toward him. In this cut the red discs, facing to the east and west respectively, are shown in dotted lines, their edges only appearing, and the third red disc faces away from the operator. In fig. 2, 1 is the white disc and 3 the opposite red disc. All the latter are round, 18 in. in diameter. The rod S is pivoted at X, but rests upon the pulley R, which turns on the inclined surface P. When the operator wishes to turn the white disc so that it will face an approaching train and give it a clear signal, he moves the handle H to the right or left, as the case may be, and thereby revolves the vertical rod S one-quarter of a revolution. The wheel R, bearing on the inclined surface P, lifts the rod, the discs and lamp slightly, and as the weight of the rod, discs and lamps then rests on the inclined surface, the signal will stay in this position only so long as the operator holds it there (by means of the handle); when he lets go the rod drops and the signal returns to danger by its own weight.

A is a hood made of No. 20 wrought iron and painted black, and is used to cover the discs when the operator is off duty. By pulling on the cord C he can lift the hood to a position covering all the red discs while still leaving the white one exposed.

Following is the rule in force on the above named road for the guidance of trainmen and operators in the use of train-order signals:

During the office hours of each signal station the train-order signal must show red, and must not be changed to white so long as there is any order not "complete" at that station. When a train approaches a telegraph station, the engineman must sound the whistle for a signal. If no orders are at that station, the operator must change the signal to white in full view of the engineman, and the engineman must then answer with two short blasts of the whistle.

After a white signal has been given, it must not be changed to red until the entire train has cleared the signal, unless the train stops before clearing the signal entirely. If, after a train receives the white signal, the train stops for any purpose before clearing the signal entirely, the operator must drop the signal to red; and if the engine has not passed the signal, both the conductor and engineman must receive clearance cards before they proceed; but, if when the train stops the engine has passed the white signal, while the rear of the train has failed to clear the signal, only the conductor must receive a clearance card before the train proceeds.

If any train or part of a train, after it has cleared a white signal, returns past the signal for any purpose, both the conductor and engineman must receive a clearance card before they proceed.

If the engineman of a train approaching a signal station expects to stop his engine for any purpose before his engine passes the signal, he must not sound the call for train-order signal until the engine is ready to pass the signal.

Operators holding orders for trains that stop before passing a signal will not deliver the order to the conductor until the train is ready to proceed and calls for the signal.

The white signal must not be given twice to any train or section of train. If the dispatcher desires to give an order to a train which has received a white signal, he must first direct the operator to bring both the conductor and engineman into the office where the order is to be given; and then after he has ascertained that the conductor and engineman are in the

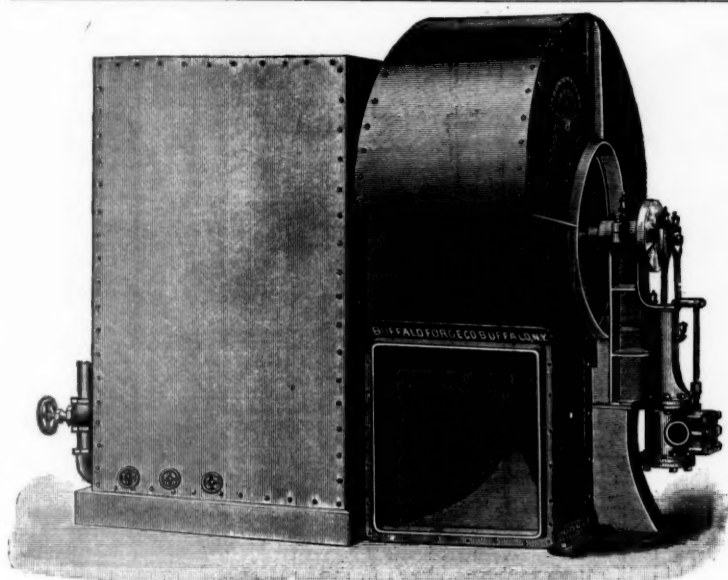


Fig. 1.

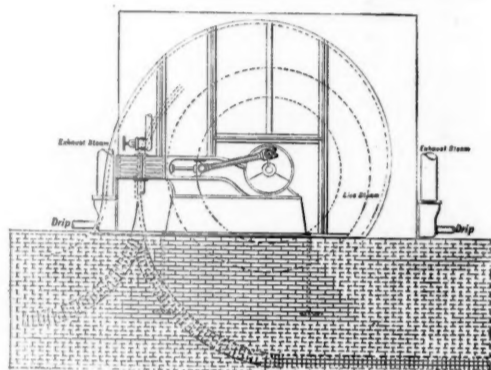


Fig. 5.

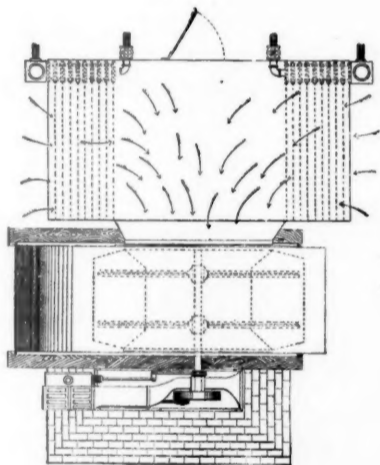


Fig. 6.

office, he can issue the order. The operator must not receive an order for a train to which he has given a white signal until he has informed the dispatcher that both the conductor and engine man are in the office. The conductor and engine man must sign the order, and "O K" and "complete" must be given to the order for this train, before the "complete" can be given to the corresponding order for the opposing train. Should the train-order signal at any day office be found covered during office hours or the signal show white when first sighted, trains must stop and see what the trouble is and get proper clearance.

The Heating and Ventilating Apparatus at the Pennsylvania Shops, Walls Station, Pa.

A quite marked improvement in the hot-air system of heating has been placed in the Pennsylvania shops at Walls Station, Pa., by the Buffalo Forge Co.

The space heated is the car roundhouse of the Pennsylvania Railroad, some 500 ft. in diameter. The fan and heater house is built separate, and the air ducts circle in both directions from the fan and heater, almost meeting at the opposite side of the roundhouse. The outlets are located at equal distances apart and hang from above, 8 ft. from the floor.

The special features of the apparatus are, of course, the fan and the heater. The accompanying cut, fig. 1, shows a fan and heater as ordinarily used. The heaters are so constructed as to take in exhaust and live steam, according to the weather, special inlets being prepared for the exhaust of the fan engine, for the exhaust steam from main engine when in use, and also for live steam direct from boiler when necessary. The sections of vertical heater pipes are connected by cross pieces at top, and the sides of the manifold sections are corrugated, fitting closely together when placed in the heater, and

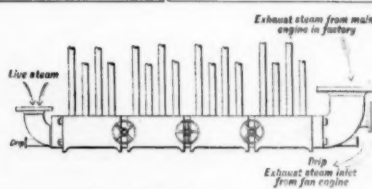


Fig. 2.

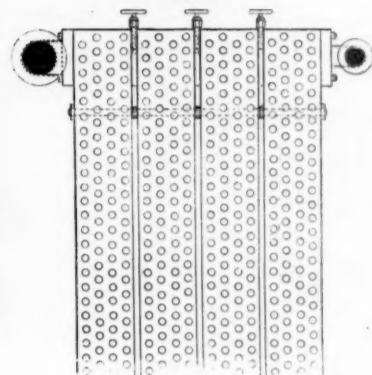


Fig. 3.



Fig. 4.

Heating and Ventilating Apparatus—Pennsylvania Shops, Walls Station, Pa.

By the BUFFALO FORGE CO., Buffalo, N. Y.

providing an equal spacing distance between the adjacent pipes of associate sections.

As shown in fig. 2, the drip and steam inlets are made of good size and direct, so as to prevent any possibility of back pressure upon the engine when exhaust steam is used. The heater is jacketed with steel plates, one end being left entirely left open to insure the air being drawn equally across all portions and locations of the heater pipes or coils. The opposite end is fitted to the inlet nozzle of the fan. The heater coils are so located that any one of the several sections may be removed at will without disturbing the others in their places.

Fig. 3 shows a plan view of a four-section heater, with steam inlets, valves, pipes and manifold sections. The side view of a section is shown in fig. 4, with a Buffalo Forge Co. patented valve in place on the left. Each section of pipe coils has one of these valves, and it may be opened or closed for use or non-use, as desired. The valve is of such shape, construction and materials that it is not liable to leak, stick or become obstructed.

An elevation and plan view of the complete heat supplying apparatus as constructed for the Walls Station plant are shown in figs. 5 and 6. The fan is provided with a three-quarter housing of steel plate, the lower portion being of brick to form the foundation for engine and wheel bearings. It is 20 ft. and 3 in. in height over all, and has a 12 in. x 12 in. horizontal engine.

A special feature of this apparatus is its usefulness in both summer and winter, furnishing in either case air, fresh, clean and suitable to the season. By merely shutting off the steam from the heater the engine may be operated to force cool air through the pipes and ducts for purposes of ventilation.

Signal Lamps.

BY ARTHUR H. JOHNSON.

At a meeting of the Institution of Civil Engineers in 1873, Mr. W. Douglas read a paper on the very inefficient construction of railroad signal lamps, remarking that they were "very little better than common stable lanterns, with lights inclosed in tin boxes; while all that is utilized is from the issue of one or two holes, from 4 to 5 in. in diameter, somewhat concentrated by a glass bull's-eye." It seems to me that the same remarks would almost apply to our general practice at the present time. It is strange that, although the semaphore day signal was adopted with very little change in shape and size from the English practice, the lamps for equally important night signaling should have so degenerated from the excellent samples supplied by Messrs. Saxby & Farmer, of London. The only redeeming feature of our present lamp is its moderate price. It is too small to accommodate an efficient flame for main line purposes, and its breathing parts are not good. A main line signal should give a much more powerful light than a tail lamp or other marker, and if most of our signals had efficient lamps and lenses, it would not appear at all necessary to go in for an expensive and unreliable illuminated blade.

It will not be time thrown away to describe and illustrate a class of lamps which gives general satisfaction in England. The use of kerosene was considered unsafe for a long time owing to its low flashing point; but as soon as suitable lamps were constructed its use for signals became general, and it was found that as compared

with common coal gas, which is extensively used in England for railroad signals, the oil gave equally good results.

In kerosene lamps it is important that the whole be kept as cool as possible. First, because if the oil reservoir becomes heated to any great extent, the oil reaches its flashing point and an explosion is liable to take place. Second: The heated oil gives off more than sufficient gas to combine with the supply of oxygen, consequently a good deal of oil finds its way out of the chimney without being burnt. Third: A heated lens does not give good photometric results. This point is so important that several patents have been granted for devices whereby a current of air is constantly passed through the lens to keep it cool.

The corrugated lens is much inferior to the solid cut-flint lens, but the first named is cheaper. The lens should be accurately focused with the burner, and the lamp should be so placed on the signal post that the stream of light is directed along the proper track, and not into an adjoining field. It is also important to maintain the proper vertical angle or dip, and for this purpose the system of having an outside lamp casing carrying the lens, and permanently fixed to the signal post, is superior to the lamp which is bodily removable and which wobbles on its bracket.

Fig. 1 shows the form of outside casing, with front and back lenses, generally used. This casing is rigidly fastened by a light cast-iron bracket to the side of the signal post. The conical top is hinged, and in the improved style is automatically fastened by a snap catch. Inside the top are fixed proper deflecting cones and baffle plates. Various forms of top are used. The solid lens is from 6 to 8 1/2 in. in diameter. The air supply is drawn through holes in the bottom.

Fig. 2 shows one form of inner casing, or lamp proper, for use with a glass chimney. The bottom of the copper case forms an air jacket for the oil box within. It will be noticed that the cold air has to pass all around the oil box before it can reach the burner through the small holes in the upper part of the air jacket. The top baffle plates are raised automatically by the drop of the

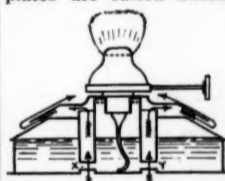


FIG. 3.

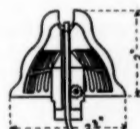


FIG. 4.

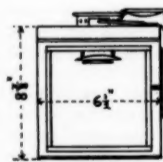


FIG. 5.

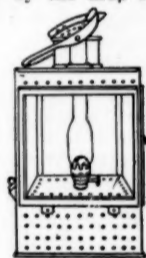


FIG. 2.

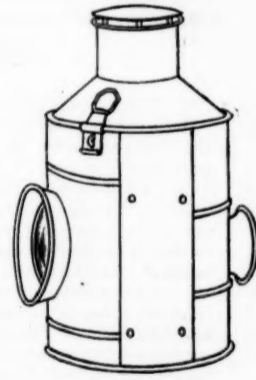


FIG. 1.

Signal Lamps.

handle, when the lamp is placed in the outer casing, but when being carried to and from the signal by hand the baffle plates fall so as to prevent the heat from scorching the hand.

Fig. 3 shows Messrs. Saxby & Farmer's no-chimney oil box and burner for use with the lamp casing shown in fig. 5. The air jacket principle is not used in this case, but the cold supply of air is drawn through the centre of the oil box, as shown by arrows in fig. 3, which is a section through the middle of the oil box. The small centre cup for the wick is separated from the main oil box by a circular air chamber, through which the air passes, and simply obtains its supply of oil through two small ducts, X and Y, which also serve to carry the cup.

Fig. 4 is a section of the burner using a 3/4-in. flat wick. Nearly all the parts are of copper, and of excellent



Fig. 1.

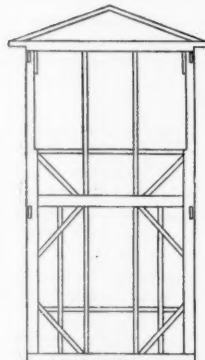


Fig. 5.

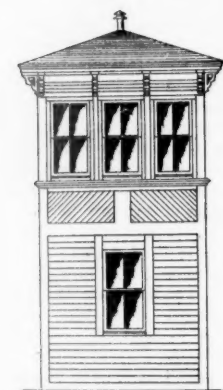


Fig. 6.

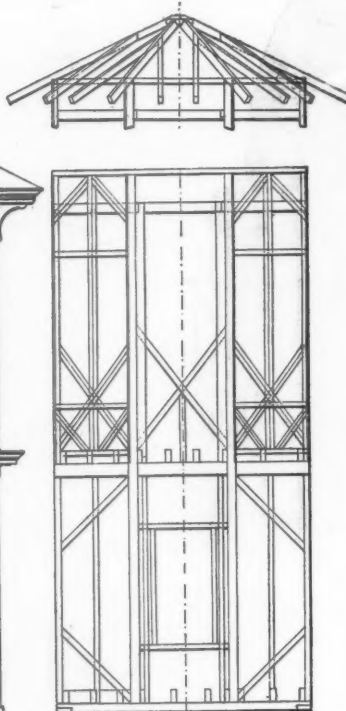
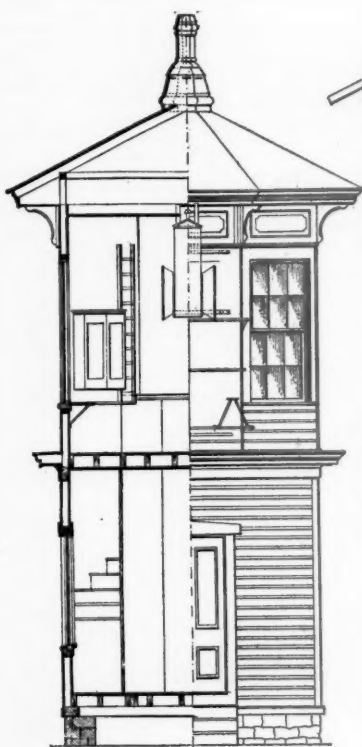


Fig. 3.

STANDARD SIGNAL TOWERS.

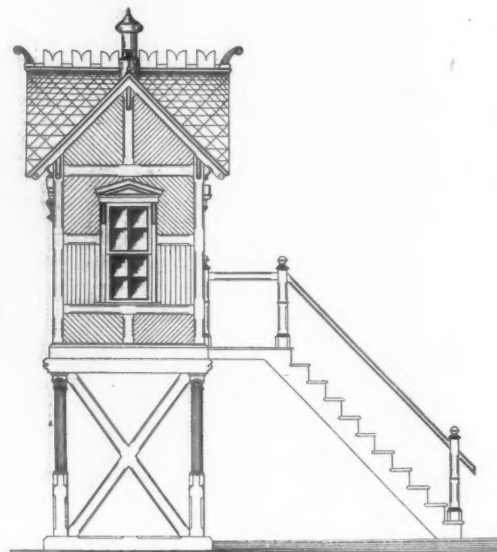


Fig. 2.

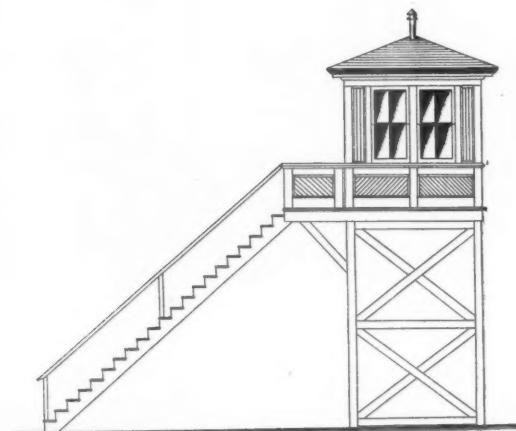


Fig. 4.

workmanship. Messrs. Stevens & Sons, of London, use much the same style of oil box. In fact, I believe they claim to have invented it. They also use a reflector in some cases to intensify the light.

It is scarcely possible to furnish a thoroughly efficient signal lamp at present prices unless the signal companies are able to sell something for nothing. The remedy seems to rest with the railroad officers.

Buildings and Structures of American Railroads.*

No. 7.—SIGNAL TOWERS.

BY WALTER G. BERG.

There are two classes of signal towers, namely, those intended to protect exposed points on the line and those forming part of a block signaling system. The former are, as a rule, simply watchman's houses set on trestles. The second class, namely, block station signal towers, form part of a more or less extensive signaling system by which the road is divided into sections or "blocks" of a length dependent on the varying conditions and necessities of the traffic.

Where there is an interlocking switch system or switches worked by levers from a distance, it is customary, if feasible, to locate the working levers in the signal room of a signal tower, so that one man can control the switches and the movement of trains. Signal towers with switch levers are usually to be found at terminal yards, stations, junction points and crossover systems.

Most railroads have block signals at their regular stations or stopping places, even where the regular block system is not employed between stations, in which case the regular operator at the station performs the duties of signalman. Station buildings, in which the operator is located in a small tower or extended gable front above the ground floor, have been quite extensively introduced, enabling the operator to obtain a better view of the road and lessening the possibility of being interrupted by passengers or others. This combination of signal tower and station building is advisable, however, only where, in addition to the station agent and other help, a special operator is employed. Where one or two men are required to perform all the duties connected with the station and the signaling apparatus, it

is objectionable to have part of the work located in the upper story.

Descriptions and plans of a number of signal towers are presented below as illustrative of the different types in actual use.

Octagonal Signal Tower, Philadelphia & Reading Railroad.—The octagonal signal tower, shown in fig. 1, represents a style of signal tower much in use on the Philadelphia & Reading at dangerous places or where the view is obstructed. This form of tower is in reality an elevated watchman's house, the signals being under the control of a special watchman or signalman. These towers are sometimes connected with neighboring towers by wires, as for instance at tunnels, in which case they become in a certain sense block signal stations. As a rule, however, they are too small for the modern block signal system, which requires more space in the tower than offered in the design under discussion, especially when connected with interlocking switch systems.

These signal towers are frame structures, from 30 ft. to 50 ft. high, and built in the shape of an octagonal pyramid, thus giving much stability against wind and side pressures of any kind. The entrance is on the ground floor, and a ladder inside the building leads up to the watchman's room. The signaling apparatus, shown on top of the tower, consists of two vanes, each vane having three faces and each face being painted a different color, signifying, respectively, danger, caution and safety. The vanes are illuminated at night by lanterns, which are lighted in the room below and hoisted into place by pulleys. The vanes are separated by a black board, against which the lights and colors are clearly seen, and are turned by levers, working upon round tables in the watchman's room, upon which are painted colors corresponding with the colors of the vanes, so that the lever being locked upon any color on the table, the same color upon the vane is known to be facing the approaching train.

Elevated Gate House, Lehigh Valley Railroad.—The gate house of the Lehigh Valley Railroad at Whitehaven, Pa., designed by W. F. Pascoe, Superintendent of Bridges, L. V. R. R., shown in fig. 2, is a good type of an elevated gate tender's house at important grade crossings, where a system of gates is in use and the clear view from the level of the railroad is liable to be obstructed. The design presented is rather elaborate for use at an open country road or turnpike crossing outside of settlements, but it is well adapted for crossings in towns and at important thoroughfares where the neat appearance of all railroad structures is considered desirable.

The building is a frame structure, 7 ft. square on the outside, set on trestles, the floor of the building about 10 ft. above the track rail. The height of frame is 8 ft. from the sill to the plate. The sides of the building are sheathed on the outside and inside with narrow tongued and grooved boards; the roof is covered with tin or slate, laid on 1-in. boards.

The principal timbers used are as follows: Sills, 4 in. x 6 in.; plates, 2 in. x 4 in.; corner studs, 4 in. x 4 in.; door and window studs, 3 in. x 4 in.; rafters, 3 in. x 4

in.; floor joists, 3 in. x 6 in., spaced 18 in.; windows, double sash, each sash four lights, 10 x 12; door, 2 ft. 9 in. x 6 ft. 4 in.; trestle legs, 8 in. x 8 in.; trestle X-bracing, 6 in. x 6 in.; trestle sills and caps, 10 in. x 10 in.

Standard Signal Tower, Pennsylvania Railroad.—The Standard block station signal tower of the Pennsylvania Railroad, shown in fig. 3, is a two-story frame structure, the lower part being square and the upper part octagonal in shape. The lower story is about 12 ft. square and about 15 ft. high, and is used for keeping sundry signal and road supplies. Steps inside the tower lead to the upper floor or the signal room, in which the operator or signal man is stationed, surrounded by the necessary signaling and telegraphic apparatus. The general design of this tower is very ornamental and attractive, while the details are carefully arranged to secure the best results in all respects without prejudice to economy. A large part of the structure is usually framed and put together in the shop before being shipped to the site.

Where an extensive and complicated switch system is connected with a block station, the space offered by the building under discussion is too small for the accommodation of the switch levers, and another standard is used, namely, an oblong, two-story frame building, the length of which is varied to suit the requirements of each case. The general features and style of the two standards are otherwise similar.

The kinds of signals controlled by the signal man are numerous.

Signal Towers, Lehigh Valley Railroad.—The signal tower of the Lehigh Valley Railroad at Jutland, N. J., shown in fig. 4, designed by C. Rosenberg, Master Carpenter, L. V. R. R., is used at the grade crossing of an important county road, where the view of the railroad from the level of the road is obstructed, making it necessary to station the gate tender or signal man at some height above the ground so as to see approaching trains.

The house proper is a small frame watch box of the usual style, 8 ft. x 8 ft. outside dimensions, height of frame about 8 ft., with large windows on all sides. This building is placed on a trestle about 14 ft. above the track, with steps leading up to the house. The trestle is built of the following timbers: Posts, 6 in. x 8 in.; horizontal ties, 6 in. x 8 in.; X-bracing, 6 in. x 6 in.

The signal tower of the Lehigh Valley Railroad at Hillsboro, N. J., shown in figs. 5 and 6, also designed by Mr. Rosenberg, is a two-story frame tower structure, 10 ft. x 10 ft. outside dimensions and 19 ft. high from ground to eaves. The first story is 9 ft. high in the clear, the second one 8 ft. 9 in. high in the clear. Steps on the outside of the building lead to the upper story, which is used for the signal man and the signaling apparatus. The lower story has three windows and a door, and is used for storing various supplies.

The principal timbers used are: Sills, 6 in. x 8 in.; interties, 4 in. x 8 in.; plates, 4 in. x 8 in.; corner posts, 4 in. x 8 in.; studs, 3 in. x 4 in.; angle braces, 3 in. x 4 in.; rafters, 3 in. x 4 in. The inside is lined with tongued and grooved boards; the outside is covered with bevel siding; the roof consists of tin on 1-in. boards; the

* Copyright, 1890, by Walter G. Berg and condensed from a forthcoming book on the subject.

windows in the upper story have 13 in. x 34 in. lights, and those of the lower story 13 in. x 26 in. lights.

The signal tower of the Lehigh Valley Railroad at Jersey City, N. J., also designed by Mr. Rosenberg, shown in figs. 7 and 8, is a two-story frame tower structure, 12 ft. x 20 ft. outside dimensions and 21 ft. high from ground to eaves.

This tower is located at the centre of a large terminal yard, and the upper story serves for signaling purposes and as an office for the yardmaster and his clerks. The elevation admits of an unobstructed view over the entire yard system, thus assisting materially in keeping track of the general movement of the cars and the trains in the yard. The ground floor is divided into two rooms, one for trainmen and yardmen to occupy when not engaged in actual work around the yard, and the other for use as a lamp, oil and waste room, and for storage of sundry small supplies connected with the train operations.

The principal timbers used are as follows: Sills, 6 in. x 8 in.; floor joists, 3 in. x 8 in.; ceiling joists, 2 in. x 8 in.; interties, 4 in. x 6 in.; plates, 4 in. x 6 in.; corner posts, 6 in. x 8 in.; studs, 3 in. x 4 in.; angle braces, 3 in. x 4 in.; rafters, 3 in. x 6 in. The inside is lined with 1-in. rough hemlock boards; the outside is covered with white pine weather boards; the roof is covered with tin on 1-in. hemlock boards. The lights of the windows in the upper story are 13 in. x 18 in., four lights per window, and those of the lower story 13 in. x 26 in., four lights per window. Stairs on the outside of the building lead to the upper story.

Signal Tower, Pennsylvania Railroad, at Newark, N. J.—The signal tower shown in fig. 9 represents a form of tower or elevated watchman's house in use on the Pennsylvania Railroad at Newark, N. J., and other places along their line where the ground space available for a tower is limited. The illustration shows the general style of the construction, the two posts or legs being 12 in. x 12 in. sticks. The door on the side toward the track is to enable the watchman to give the proper hand or flag signals to trains.

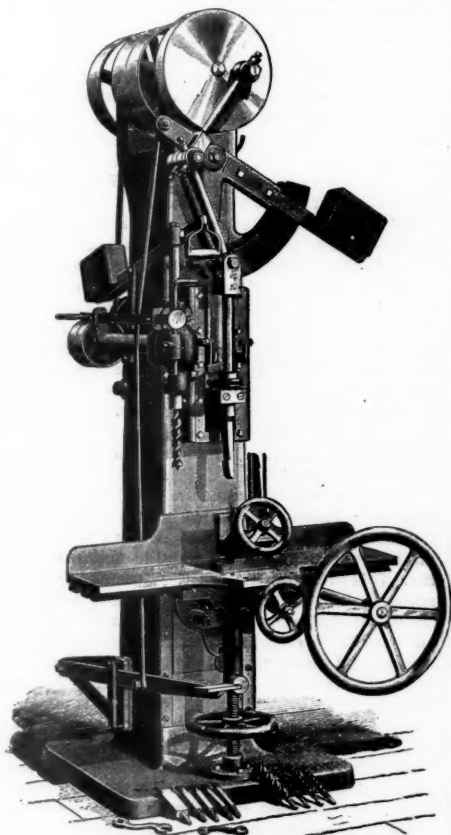
Signal Tower, Atchison, Topeka & Santa Fe Railroad, at Chicago, Ill.—In fig. 10 a perspective view is shown of a signal tower in the terminal yard of the Atchison, Topeka & Santa Fe Railroad at Chicago, Ill. This building is about 6 ft. square and rests on four posts, each 6 in. x 6 in., which are fastened to a frame work bedded in the ground. The four posts mentioned form a square, that only takes up 24 in. of ground space. Iron rungs fastened to the posts on one side of the square form a ladder leading up to the house, the entrance being through a trap door in the floor. A number of switch and signal levers are located in the house, the connecting rods down to the ground being placed inside the square formed by the posts.

Signal Tower at Jersey City, N. J., Central Railroad of New Jersey.—In fig. 11 is shown a perspective of the large signal tower of the Central Railroad of New Jersey, connected with the large interlocking switch and signal system in their terminal yard at Jersey City, N. J.

Graduator Stroke Mortising Machine.

The engraving on this page has been sent to us by the builders, who are well known to our readers. The machine shown belongs to a class called "graduater stroke mortising machines," which were first invented in Cincinnati, O., more than thirty years ago, and so far have never been made anywhere else since. This is a singular circumstance, but it is true, and the claim is made by the writer after a tolerably thorough acquaintance with the matter in this and various other countries.

A "graduater" stroke machine and a "variable"



Graduator Stroke Mortising Machine.

stroke machine are very different. Of the latter there have been many invented. Of the former, as said before, only two have come into general use. In a graduater stroke machine the chisel is set in motion from a

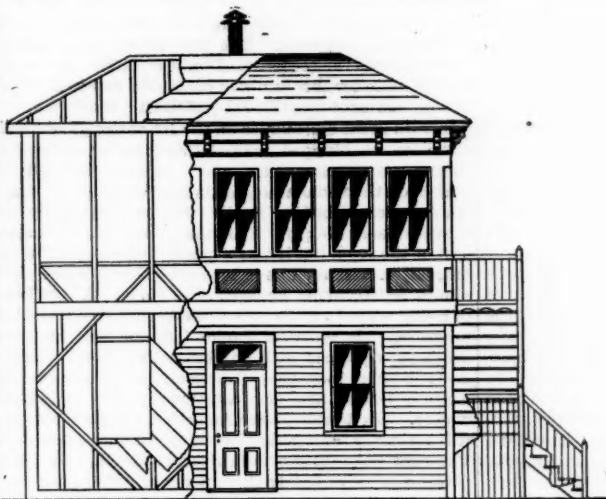


Fig. 7.

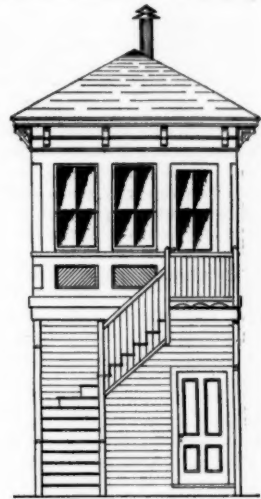


Fig. 8.

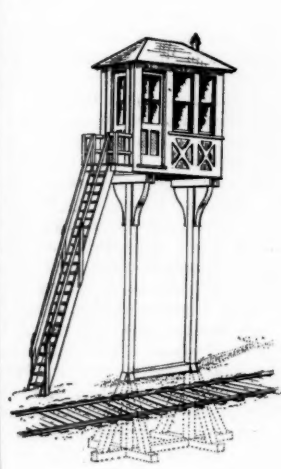


Fig. 9.



Fig. 10.

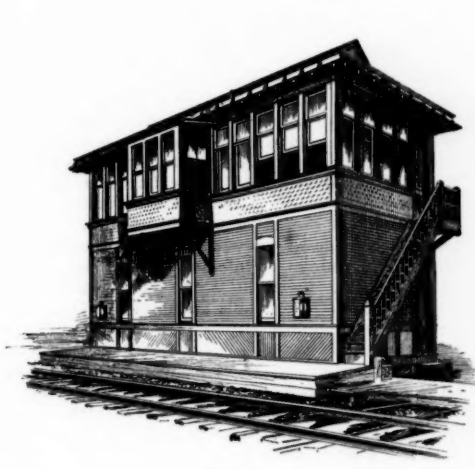


Fig. 11.

STANDARD SIGNAL TOWERS.

still point, its stroke gradually increasing downward from that still point, and not as in a variable stroke, passing equally above and below the centre. In the first case the stroke of a machine need not be greater than from a half to one inch more than the depth of a mortise; but in the variable machine the stroke must be twice the depth of a mortise, plus the clearance. For illustration, a graduater stroke machine will cut a mortise 6 in. deep with a stroke of 7 in., and a variable stroke one will require a range of 13 in. for the same work.

As a geometrical problem this is by no means plain and has not been well understood in this country and not at all in other countries. This feature of operation was, no doubt, an accident at the beginning. A Cincinnati mechanic by the name of Guild, of the firm of Hinkle & Guild, contrived a power attachment for a foot mortising machine between 1858 and 1860. To give the chisel a reciprocating motion he placed beneath the floor a pivoted vibrating lever, and on this fixed a sliding block, to which a link from the chisel slide was attached. This block was moved on the lever by means of a treadle, and when brought to the outer end, where the crank connection was attached to the lever, the effect was the same as though the chisel bar was connected direct to the crank, giving a full stroke to the chisel, the lever having no function; but when the block was moved back to the fulcrum of the lever the motion of the chisel bar stopped, but it stopped at the top of its stroke by reason of the diagonal position of the connecting rod to the chisel bar. This machine would cut mortises nearly as deep as its stroke, and when not at work the chisel bar would stop.

This was the beginning of what has proved a great invention in wood working. The machines were improved; the lever was placed on the top and made an integral part of the machine. Messrs. Lane & Bodley, of Cincinnati, began the manufacture, and have made thousands of machines on the Guild principle.

The other graduater movement, embodied in the Egan Company's mortiser, shown in the illustration, was a later invention, made by Mr. G. V. Orton, formerly of San Francisco, Cal. The first machine was made about 1865, and while it had the movement required for the chisel bar, it communicated so much jar or shock to the treadle that workmen declined to use it on hard wood. This is overcome by various expedients, one of which, and a very complete one, appears in the present machine.

The movements of the machine are difficult to explain; it is called a triple connection, or sometimes a knuckle joint movement. When the chisel is at the top of its stroke, and still, the two lower links vibrate on the same centre at the

bottom as well as the top end; but when the back link, the one next the column, has its lower fulcrum moved away from that of the one attached to the chisel bar, then the latter gradually partakes of the crank motion until the two front links form a vertical line through their centres, and the chisel has a stroke equal to that of the crank above. There are advantages in both the Guild and Orton methods, but the latter is more compact and capable of high speed.

As remarked in the commencement, it is wonderful that an invention of such importance should not have found its way into wider use in thirty years; but it must be remembered that not one in ten who use the machines understands the principle involved in their movements. The machine illustrated is an ingenious adaptation of the triple link movement, is well designed, and, what is especially essential in a mortising machine, strong and substantial. It has been designed for car works, railroad shop repair work, etc. Further information may be obtained from the builders, The Egan Company, Nos. 202 to 222 West Front Street, Cincinnati, O., U. S. A.

The Railroad System of Chile.

BY F. W. CONN.

Chile has more miles of railroad than most people suppose. I use the word system, advisedly, for she has a system, and a very good one it will be when completed; a trunk line to extend the whole length of the country, between the Cordillera de los Andes and the coast range, with feeders to the coast and the mountain valleys, and one or more lines to cross the Andes and connect with the Argentine system. This is being built and operated by the government.

There are in operation to-day over 1,000 kilometres, as much more being constructed, and the balance, as soon as an estimate can be made, will open for bids. There are quite a number of short roads owned by private corporations. These are mostly in the north of Chile and run from the coast to the nitrate beds or the copper mines. The trunk line, when completed, will connect with all these roads. In describing roads now in operation, we shall begin at the north end of Chile and go down the coast.

The first is the Arica & Tacna, reaching from the port of Arica to the town of Tacna, a distance of 63 kilometres. This road was completed in 1854. It is controlled by English capital, with its principal office in London.

Next we have the Nitrate Railway Company (Limited). This road connects the ports of Pisagua and Iquique, and runs to various nitrate deposits. It has in all 370 kilometres. To get up out of Iquique and Pisagua switchbacks are necessary. It is a fine sight from aboard ship

to see four or five trains coming down the face of the bluff, all in sight at once. The double-end Farlie engines are used on this road. Maximum grade, four per cent.; gauge, 4 ft. 8½ in. In 1888 it paid 25 per cent. in cash dividends.

The Patillos Railroad extends from the port of Patillos to Lagunas, a distance of 110 kilometres. It is at present owned by an English syndicate, but before the Chilean-Peruvian war was owned by the Montero Bros., of Lima. It has a gauge of 2 ft. 6 ins. Next below this is the Mejillones & Sierra Gorda Railroad, a nitrate road 25 kilometres in length.

Continuing on down the coast we come to the Antofagasta road. The present company is a consolidation of the Antofagasta Nitrate & Railroad Company and the Antofagasta & Bolivia Railroad. This road has recently been completed to Huanchaca, a distance of 650 kilometres. The controlling interest in the road is owned by the Huanchaca Mining Company. It is to be extended to La Paz, the capital of Bolivia, and via Potosi to connect with the Argentine system. This, I am confident, will be the first trans-continental road in South America. The gap to be completed is longer than between Mendoza and Los Andes, but the work will not be nearly so difficult. The company is pushing the work.

The line to Huanchaca was, for the most part, easy of construction. Leaving Antofagasta, the road goes up a cañon to the tablelands. The track is laid directly on the bottom of the cañon, with no embankment whatever. A two hours' rain would wash out a hundred miles of it; but there is no danger—it never rains there. The line crosses the desert of Atacama, passing through many valuable nitrate fields. There are said to be many rich mineral deposits in the broken ranges of mountains that dot the desert. It is to be hoped so, for a more God-forsaken country I never saw. For the first 300 kilometres, to the town of Calama, there is not a tree, not a blade of grass, nothing but rock sand and dirty white chunks of nitrate. Calama is an oasis—nothing more. It is the same thing again beyond. There is no water the whole distance, and the stations have to be supplied with water drawn from Antofagasta, where water is obtained from the Pacific Ocean by distillation. The few mines that are worked on the desert obtain water from the nearest station. In some cases it is packed on mules a distance of forty miles. Although this road was easy of construction, it does not follow that it was built cheaply. Labor is scarce at from \$2.50 to \$5 per day, and supplies are very high. The country produces absolutely nothing. The road does a good business, bringing down nitrate and ore. The Huanchaca Company is putting in a \$4,000,000 plant in Antofagasta, and will haul all its ore here to be treated. The gauge of this road is 30 in., but it will undoubtedly be changed when connection is made with the Argentine system. As is the case with all roads in Chile, there are very few foreigners employed. The rolling stock is nondescript, but they have some good engines.

Between Antofagasta and Caldera there is quite a number of railroads, all running from the coast to nitrate fields or mines.

The Taltal Railway is a narrow gauge (3 ft. 6 in.), running from Taltal to Cachinal, a distance of 143 kilometres. There are several branches projected. It is an English company, with principal office in London. There is a short line from Laraquete to Maguegua, 44 kilometres. The Anglo-Chilian Nitrate & Railway Company has a line from Tocopilla, 82 kilometres long.

The Chañaral Railroad, running from Chañaral to Salado and Las Animas, has recently been purchased by the government. The gauge is 1.67 metres (5 ft. 6 in.); length of road, 86 kilometres.

The original Copiapó Railroad extended from the port of Caldera to the city of Copiapó. This is the pioneer railroad of Chile, having been completed in 1852. It was built by an American by the name of Wheelright with capital raised in the city of Copiapó. The actual grading of the road was not difficult, but the question of supplies was a serious one. When the engineers landed, in 1850, at what is now the thriving port of Caldera, there was not a single house. All supplies had to be brought in by steamer. The water was bad; so bad, in fact, that it could not be used in the locomotives, and a distilling apparatus was erected to utilize the water of the Pacific. The total cost, including equipment, station houses and pier at Caldera, was \$1,300,000. The receipts in 1853 averaged \$32,000 per month. The country through which the road runs is but little better than a desert, but contains some of the richest mines in the world. The line at present reaches to San Antonio, with branches to Charnacillo and Puquios, in all 246 kilometres. It is 4 ft. 8½ in. gauge, and laid in part with 72-lb. steel.

The next line is the Carrizal & Cerro Blanco Railway. This road has 311 kilometres in operation. It has a gauge of 4 ft. 2 in. The business is mostly derived from the copper mines. This is also an English road.

The Coquimbo Railroad runs to Serena and Ovalle, having in all 122 kilometres. The Elqui Railroad connects with this road at Serena and extends to Elqui, a distance of 88 kilometres.

Next in order comes the Tongoy Railroad. This line is operating to Cerillos, 47 kilometres, with several short branches to smelting works. It is to be extended to Ovalle. This road is, I believe, already turned over to the government.

This brings us to Valparaíso, the initial point of the government railroads. The line from Valparaíso to Santiago was the second road built in Chile. The original estimate for this line was \$8,000,000, towards which the government contributed \$2,000,000. Work was begun with great ceremonies on the 1st of Oct., 1852. Construction was stopped several times owing to lack of funds, mismanagement and revolutions, all of which are the usual accompaniments of work in Spanish America. The line finally was completed by the famous Henry Meiggs. I am unable to state the actual cost of the road, but it was a great deal more than the original estimate. I have been told that Meiggs made almost \$8,000,000 for himself. His Monte Christo style of living while in Chile goes to show that he did not lose anything. It is broad gauge (1.67 metres), and was originally equipped with English rolling stock. At the present time they have American parlor cars on the express trains, and one occasionally sees a Baldwin engine. The people prefer American rolling stock, and it is gradually taking the place of the English equipment. The road was rather a difficult one to build, and has in places a grade of nearly three per cent. It runs through several very fertile valleys and does an immense local as well as through business. The rolling stock is entirely inadequate to handle the traffic, and, in fact, there is too much traffic for a single track road to manage.

Another line via Melipilla is now being constructed; but of this, more farther on. The employees are natives, with the exception of the runners. The latter are mostly Scotchmen. The Chillanos, as a rule, do not make good engineers. There are also quite a number of Scotchmen in the shops. Trains are run on the block system and make good time. Express trains run from 30 to 40 miles an hour. There are first, second and third class cars, of the ordinary English type. The check system is used for baggage, but all baggage taken to be checked is weighed, and has to be paid for at so much the kilo. No baggage is carried free, except what you take into the car with you, and as a consequence the cars are littered up with a great deal of baggage. No passes are issued, but instead one gets an order for a ticket, which order is not good on the trains, but must be exchanged for a ticket, and a receipt given. One must have still another order for free baggage.

The most important line in Chile now in operation is the Lina del Sur, being a part of the trunk line before spoken of, which is to extend from end to end of the country. The Lina del Sur proper runs from Santiago to the port of Talcahuano, a distance of 616 kilometres. Leaving Santiago the line runs nearly due south, keeping between the coast range and the Cordilleras, and parallel with the coast. The peculiar formation of this part of the country made the building of a north and south line comparatively easy. There is a series of valleys of different elevations, all perfectly level, and apparently the beds of ancient lakes. The only heavy work is getting from one valley to another. Each valley has a broad, shallow, rapid running river, and, fed as they are by the everlasting snow of the Andes, are liable to sudden rises. The bridges are first-class structures, built of iron, by the firm of Lever & Murphy, of Valparaíso. The line runs through the most fertile and most thickly settled part of Chile, and does a large local business. The principal stations are San Bernardo, Rancagua, San Fernando, Curicó, Talca, Parral, Chillan, Concepcion (called the capital of the South), and the port of Talcahuano. At the latter place the European steamers land their passengers, who can go through to Santiago in 12 hours, which is 48 hours quicker than via Valparaíso. The equipment of this line is largely American. The passenger trains are made up of coaches built in the United States, or coaches built in the country, of the United States pattern, and drawn by Baldwin engines. On some divisions the Baldwin mogul is used. Lever & Murphy have built some 25 locomotives for the government, and if they are a success all locomotives will be built in the country. Express trains have parlor cars, and run about 40 miles an hour.

The employees are with very few exceptions Chillanos, and the service on the whole is good. Most passenger trains carry a car for horses. Each station has a pen for loading horses, so located that it can be used while the baggage is being handled. An "Haciendado," followed by his servant, rides up to the station, takes one first, one third-class and two horse tickets, gets aboard the train, goes to his destination, mounts his horse and rides away. The horse car is a very convenient service in a country where everybody rides. The trainboy, instead of periodicals, carries cognac, beer, whisky and ice cream. The station houses are mostly of brick, and the principal ones, together with the entire yard, are inclosed by a high and substantial brick or stone wall. This, I suspect, is a precaution in case of war or revolution, and is certainly an excellent idea. Each station is a fortress in itself, and can be taken only with the aid of artillery.

At San Rosendo the line strikes the river Bio Bio, and follows down the river to Concepcion and thence to the port of Talcahuano. At the latter place the government is expending some \$5,000,000 in docks. Talcahuano is the terminus of what is at present known as the Lina del Sur.

An English syndicate (The Aranco Railway Company) has recently completed a line to and beyond the city of Aranco, passing through the coal fields of Coronel and Lota. This line starts from Concepcion, and not Talca-

huano. The bridge across the Bio Bio is one of the longest in the world. Although the concession of the road was in perpetuity, with no option of government purchase, it is reported that it will pass into the hands of the government.

At San Rosendo the continuation of the trunk line crosses the river and penetrates to the heart of the wheat country. From Robleria there is a branch running to Angol and Traiguén. The present end of the trunk line is Collipulli. The government is building on to Victoria, and the road is ready for operation except for the bridges, of which there will be quite a number. The bridge at Collipulli is let to a French syndicate, the contract price being about \$3,000,000. The thoroughness of the location of this part of the line is open to question. One is forcibly reminded of the Czar of Russia's idea of a railroad from St. Petersburg to Moscow.

A contract for the extension of the government lines was awarded in the latter part of 1888 to the North & South American Construction Company. These extensions amounted in the aggregate to nearly 1,000 kilometres, comprising 11 different lines and branches, each taken for a lump sum, the whole amounting in round numbers to \$20,000,000 gold. By the terms of the contract, the lines were to be constructed, equipped and operated for one year before being received by the government. The company's representative signed the contract without inspecting any of the proposed lines. The contract was based on the government engineer's estimates and locations, and the prices on all but one of the lines were too low. I was over all the lines in the interest of sub-contractors, and know whereof I speak. Such firms as McAuther Brothers, James Ross & Co., Col. Gainer and Ross & MacKensie, went to Chile to take some of this work, but none of them would touch it. There was a good margin on the equipment, and perhaps the Construction Company, with good management, might have pulled through. The company had no plant whatever, and tools were purchased in wholesale stores at retail prices and work was begun. About this time one of the directors arrived from New York armed with the necessary authority to oust the vice-president and take charge himself. This made trouble at once, as the former representative had many friends in power. High words between the managing director and the ex-vice-president at the Union Club, in the presence of some of the best men in the country, a challenge, and then no fight, did not tend to improve matters. An unfortunate remark by the chief engineer of the company to the effect that the government engineers were no good, did not help matters. Monthly estimates were refused on the ground that the work was not being done according to the specifications. This was true enough; the specifications said that the slopes of the embankments must be sodded, and that the ditches should be one metre wide and one metre deep, with a slope of 45 degrees. If any more earth was needed for embankment, it must be hauled from the nearest cut. The limit of free haul was 500 metres (1,640 ft.). At the prices given it was utterly impossible for the company to fulfill its contract and the government plainly showed its intention of holding them to it. A government engineer in charge of one of the lines went to the Minister of Public Works with a story that the Construction Company had attempted to bribe him. And so matters went on from bad to worse, with constant quarrels between the local representatives of the company, and finally the concessions and contract were given up. Work is now going on under government supervision.

The most important of these lines is the one from Victoria to Osorno, with a branch to Valdivia, the whole line being 403 kilometres in length. This is the extension of the trunk line and will complete the southern end. It will run through a fine timber country and the best land in Chile, as yet untouched. The estimate for this line was made from a preliminary survey which could be very much improved upon. Politics have something to do with the location of railroads in Chile—so the opposition say. If the North & South American Construction Company had had a clause in their contract allowing them to re-locate with their own engineer, they could have made a big thing.

Another of the important lines that was included in the contract above mentioned is from Calera to Cabildo, 90 kilometres, and is projected through to Iquique. This will be much more difficult to build than the southern line. It is to be one metre gauge, which, I think, is a mistake, as all the rest of the trunk line is 1.67 metres. The maximum grade is 3 per cent., and there are some curves of 75 metre radius (about 23 degrees). This could be improved upon. This road, once completed to Iquique, Chile will have 2,000 miles of a north and south line.

Now, all the routes that have been proposed for the Inter-Continental Railroad, which is to bind North and South America together, are on the east side of the Andes. I am of the opinion that the west side is the better. On the east side the line must make a wide détour to avoid the large rivers of Brazil. This would throw the line into an entirely unknown and undeveloped country, undoubtedly very rich, but would bring in no business at the start. A line down the west coast would be several hundred miles shorter, and would get into a developed country sooner. Now that the Grace contract has been ratified, construction is resumed in

Peru. Cost has not quite ceased to be a consideration in the construction of railroads, and I am confident that a line down the west coast will be the cheaper. It has been stated that such a line is impossible; but it is not so. Any one who has been over the ground knows better. Long before the Pan-American road reaches the Isthmus there will be four transandine roads in operation, so that it will be a question of the shortest and cheapest connection.

But to return to Chile. The other lines included in contract with the North and South American Construction Company were as follows: From Talca down the Maule River to the port of Constitución, a distance of 85 kilometres; Córhué to Mulchen, 52 kilometres; Santiago to Melipilla, about 60 kilometres. (This line is to be extended to Valparaíso.) The Illapel line to reach from Illapel to the coast, Huasco to Vallenar, and extensions to the Coquimbo Railroad. From Llai Llai, the dinner station on the Valparaíso-Santiago line, there is a branch to San Felipe de los Andes. This is the western end of the Transandine Railway. This road is being constructed under concession granted to Juan Clark by both Chile and the Argentine. [An account of it was published in the *Railroad Gazette* Oct. 17.] Work is being rapidly pushed at both ends. There should be, at least, 100 kilometres in operation from Mendoza. When I left Chile about a year ago there were 4,000 men at work. This is a difficult and expensive line to build, and will take several years to complete. One location had a tunnel eight miles in length, but this has been changed to a series of shorter ones. There are several better passes for a railroad to get through the Andes in the south of Chile, but this is the shortest route between Santiago and Buenos Ayres.

There has been a concession granted for a road from Tumbel up the Rio Laja and through the pass of Pichachen into the Argentine. Interested parties are in Europe to raise the necessary funds. This is the best pass that I have seen in the whole length of South America, and, in my opinion, a railroad can be built through it with an easier grade and at less expense than through any other. The elevation of this pass is 6,800 ft., while that of the Cumbre, through which the Clark road will pass, is 12,500 ft.

Then, again, this pass is in almost a direct line between Concepción (the second largest place in Chile) and Buenos Ayres, and the eastern end will pass through some of the best land in the Argentine. This road can be built with a 5 ft. 6 in. gauge, the same as the government roads in Chile and most of the railroads in the Argentine, whereas the Clark road is one metre gauge and will have several sections of rack rail. In the far south of Chile there are several lower passes, but liable to be blocked with snow in winter.

The net earnings of the government railroads for 1889 were \$2,152,370.64, but the opposition paper has considerable to say about these figures.

The street railroads of Valparaíso and Santiago are well-managed and well-paying institutions. They have the two-story car, which is so justly popular, and in common use in every country except the United States.

It is to be hoped that, when the Inter-Continental Railroad is completed, the United States may do a better business with Chile; but we have a prejudice to overcome which dates back to the Peruvian-Chilean war, and our merchants will find well-established English and German capital to contend with.

Form of Bill for Freight Car Repairs.

We show herewith a sample of a bill devised by Mr. E. W. Yates, of Aurora, Ill., for charging foreign roads

with the amounts expended for repairs of such roads' cars. This form has been in use several months and has been found extremely convenient. Where several cars are entered on a single bill only one calculation is necessary, the footings of the several columns being simply multiplied by the price applicable to that column. There being a convenient space for each item, there is not the temptation to lump items together, or to give insufficient information, that exists where no guide is provided for the clerk. Time is saved in making the bill and there is less liability to error in writing out details and in checking the bill.

In connection with the bill Mr. Yates provides a card to be filled out by the foreman for each car repaired. This card has 25 lines, and the various kinds of material named in the headings of the columns on the bill are printed in a convenient form to enable the foreman to enter the quantity used of each with the least possible writing. For renewals of wheels and axles a separate form, giving fuller particulars, is printed on the reverse of the card. In this, besides giving the date, place and initial and number of car, there are columns (under the heads of "wheels and axles removed" and "wheels and axles applied") for maker, date, cost, number on wheel, cause of removal, shop mark, etc. The 16 different causes tabulated in rule 9 of the Master Car Builders' code of interchange rules are stated on the card with their appropriate letters, and the foreman must indicate the cause for removing a wheel or axle by writing the proper letter against it in filling out the card.

Station Operator's Record of Train Orders.

In the discussion printed in the issue of Oct. 10, concerning mistakes of operators in handling train orders, it will be remembered that reference was made to the necessity of careful provision for transferring the business on hand from one operator to another at night and morning, or at other times when one operator relieves another. A transaction as important as this cannot safely be conducted except under rigid regulations, and the minutest movement needs to be made the subject of record. In connection with the discussion of this subject Mr. J. J. Burns, Superintendent of Transportation of the Denver & Rio Grande, has sent us a copy of Form 3250, used at the telegraph stations of his road, and we print below a sample of such a blank, filled out. In describing it Mr. Burns says:

"This record is kept in all offices and is open to the inspection of conductors. It affords a check to avoid the possible overlooking of an order, where several are taken for the same train, or for different trains. Each order received must be entered on the record, and if one is cancelled the fact is shown by the entry of the cancelling order. Trainmen can thus see at a glance what orders are out for them, as well as those for other trains, or for the operator which may interest them. Operators, when relieving each other, are required to sign for all orders received which the record does not show delivered, and the operator to be relieved cannot go until this record shows the proper disposition of every order received while he was on duty, or a receipt for those on hand from the relieving operator. With this check of trainmen against operators, and of operators against each other, errors such as are reported in the Mauch Chunk case are pretty thoroughly guarded against. "In the train dispatcher's office likewise each dispatcher is required to receipt for all orders out which are unfulfilled when he comes on duty."

A record of the arrival and departure of all trains is kept on the same sheet, columns for the two records being printed side by side. These records are sent to the division superintendent weekly. The record here shown is supposed to have begun at midnight, and the operator on duty at that hour writes his own name at the head of it. It will be noticed that four orders received

by him were still on hand at 7 a. m., and were signed for by the day operator. One of these (No. 9) was afterward cancelled by a new order, No. 57. A column for noting the time that orders are received would seem to be a desirable addition to this blank.

Record of Train Orders.

Order.	Train.	Engine.	When delivered or canceled.	Operator's transfer 7 a. m. Signature of relieving operator.
1	6	79	Del'd 12:15 a. m....	
2	3	70	Del'd 12:20 a. m....	
9	17	92	Canceled, order 57.	J. Smith.
15	2-18	501	Del'd 3:15 a. m....	
26	Spl. W.	49	Del'd 5:10 a. m....	
31	Ex. E.	250	Del'd 6 a. m....	
36	1-65	572		J. Smith.
	2-65	580		J. Smith.
37	3-65	600		J. Smith.
	Opr.		Cancelling order 15.	

The Steel Conference at Washington.

Thursday, the 16th, a conference of ship builders and steel makers was held at the Navy Department, Washington. It was held to consider the causes of the delay in obtaining steel for the vessels now under construction for the navy and to discuss ways and means of avoiding delays. The ship builders presented their case first, stating that they were behind in their contracts because of the delays of the steel men in delivering material. The steel men stated that the delays of delivery were due to various causes. Mr. Scott, President of the Union Iron Works, of San Francisco, suggested that steel castings should not be required, but that forged parts should be substituted. Mr. Palmer, of N. F. Palmer, Jr., & Co., of New York, agreed with Mr. Scott. Carnegie, Phipps & Co. wrote that they were entirely satisfied with the tests now required. The Phenix Iron Works considered the requirements too high. Mr. Malster, of the Columbian Iron Works, thought that the chemical tests were too exacting, and that the inspectors had not sufficient discretionary powers to pass slight defects which were superficial and would not injure thick plates. Mr. Charles H. Cramp stated that at first many plates were rejected because of surface defects, but that lately rejections on that account had been few. There was no uniformity, however, in rejections. He did not agree in advocating the substitution of forging for cast steel. He believed that it would be economy if castings showing slight defects, which could be made good by local strengthening, were so treated and used. Mr. Harrison Loring thought that the tests were too severe. Mr. Wetherill, of the Standard Steel Casting Co., of Pittsburgh, thought that both the chemical and physical tests were too exacting. Castings were sometimes delayed for months for inspection. The Solid Steel Co., of Alliance, O., had no fault to find with the specifications. Mr. Petrie, of the Midvale Steel Co., did not object to the specifications, but believed that the inspectors should be allowed more latitude. Mr. Paige, of Parke Brothers & Co., Pittsburgh, said that the principal delay with his firm had been the rejection of plates, which had already passed inspection at the works, after they were received at Norfolk. He thought the system of inspection too elaborate, and said that as the inspectors were on duty only in the day time his mill could not run nights on government work. He should not bid on any more steel for hull plates if plates were to be pickled. He thought that a higher class of inspectors should be employed; those who become competent by experience are promoted or sent away. Mr. Taylor, of the Linden Steel Co., complained also that the inspectors were not always on duty, and that plates were rejected for surface defects which were quite unimportant. The Chester Rolling Mills did not complain of the specifications, but of the great number and detail of inspections and tests. Representatives of various other works spoke, but those who have been quoted represent the sentiments of all who were reported.

A. & B. R. R.

C. Brown, M. C. B., Constantinople.

To the Pan American Railroad Company, Dr.

Department.

For Repairs to Freight Cars as per Defect Cards attached. Month of March, 1890.

DATE.	WHOSE CAR and NUMBER.		DESCRIPTION OF PARTS REPAIRED.	Value of Miscellaneous Material.	CAST IRON.	Bolts and Forgings.	Steel.	NAILS.	PAINT.	CHAIN.	PINE.	OAK.	Labor, No. of Hours.	CREDIT FOR SCRAP.		
	INITIAL.	NUMBER.												CAST IRON.	WROG IRON.	Steel.
March.	A & B	9000	1 Draw Bar.....		Lbs. 100	Lbs. 20							3	Lbs. 90	Lbs. 15	
9	C & E	5000	1 do. Spring.....				30						1			20
10	K & L	1000	1 Brake Beam.....						1				15			
15	M & D	2000	Brakes.....		60	30							3	40	20	
16	D & L	3000	1 End Post.....								30	14	1			
6	B & J	3090	End Sheathing.....				1	2			18		2			
14	K & Q	9000	1 Oil Box.....		80								2	74		
17	J & Q	4040	Roofing repaired.....				2	3			28					
			1 End Stiff.....								30	40	17			
21	O & P	9040	1 Patent Coupler.....	15	00								3		100	
25	P & L	4040	1 End Door.....	3	00											
28	L & M	9010	1 Air Hose, 2 @ 30c.....	3	60								1			
30	B & Q	3090	Corner Moulding.....				1	1			10		1			
Quantity.....					240	50	30	4	7		116	69	35	204	135	20
Price.....					2	4	5	3	5		3	3	20	94	1	94
Value.....				\$	18	60	\$4.80	2.00	1.50	.12	.35		7.00	1.53	1.35	.15
Total of bill.....				\$49	92											
Per Wheel Statement attached.....				11	50											
Less for Scrap.....				61	42											
Total.....				3	03											
				\$58	39											

NOTE.—Italics indicate words written in; Roman letters the printed portion.



Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The nub of Mr. Depew's address at Pittsburgh is found in the argument that employés in dealing collectively with their employers should be represented by one of their own number. Every sensible person will agree that a man versed only in shoemaking or bricklaying is unfit to represent engineers or brakemen; but it is important to bear in mind that it is not his knowledge of shoes, but his ignorance of train handling, that makes such a man incompetent. The engineers truly are, as Mr. Depew says, the best labor organization in the country, if not in the world; but their success, largely based on Mr. Arthur's wise policy, is owing as much to that gentleman's native ability as a diplomat as to the fact that he has run an engine; possibly much more so. And, indeed, the latter circumstance, which may be said to give him power with his constituents, in contradistinction to the function of diplomacy as giving him power with an opponent, is very likely of much less consequence than his personal sympathy with the engineers, which is rooted in qualities of mind and heart quite different from skill in handling the throttle or the monkey-wrench. A man like Mr. Arthur could learn to be a leader of engineers without ever touching an engine; but, unfortunately, the process is not so readily reversible; few engineers, or brakemen, or railroad employés of any kind can become leaders. This being the case, it is the right of every class to hire a leader outside their craft; only in this way can "labor" always be free in its effort to "be as intelligent as capital on its own ground." The sad lesson of experience is that men are almost sure to make a mistake in exercising this right; but it is theirs nevertheless.

In speaking last week of the demand of the Erie employés for more pay, we said that there had been no evidence of a pronounced unreasonable spirit on the part of the men. This was true, so far as the public reports were concerned; but in view of a fact which we learn from a person who knew of some of the negotiations between the men and the officers of the company, it is not safe to say that the employés were wholly reasonable in their methods. It will be remembered that little was said about any definite organization among the employés; and we remarked at the time that it was not apparent how the committee represented the conductors and brakemen. It turns out that they had no written or formal authority of any kind. These spokesmen simply asked to be heard on the verbal assertion that so-and-so represented, for instance, all of the conductors on their respective divisions. Such a slipshod procedure as this goes far to justify the feel-

ing among many railroad officers that employés' organizations are to be discouraged, and it tends to prove what we have said above about the lack of wisdom observable in transactions of this kind. What is more natural than for an officer to assume that such a "committee" is practically self-appointed? We said that men make mistakes in selecting leaders; they also make grievous mistakes in not vigorously disavowing all connection with men who are not their leaders.

The most noticeable feature of the discussion on train rules at the recent Superintendents' convention in New York City was the need, which was clearly shown, that the Time Convention committee which made the standard code of train rules inform the members of the convention, and all who ought to use the code, the reasons why they omitted certain subjects from the code. The committee did, indeed, give this information in the shape of notes to a few of the rules, and considerable light on this point was afforded by the discussion in the convention when the code was up for adoption. It is of course equally necessary in many cases to give the reasons why a rule was not omitted, but we mention the negative aspect of the case because it is less obvious. Aside from the fact that young superintendents are constantly coming to the front, and that the men below this grade, who are still younger, also deserve consideration in this matter, it is to be remembered that the discussion in the convention was very long in comparison to the amount of wisdom evolved, and that it is scattered through a number of pamphlets not always easily obtainable. What is needed is a sort of a condensed history of the discussions in the Time Convention's committee. If we take the ground that the convention itself cannot afford the time to discuss all these points and to explain the arguments for and against them over and over again, year after year, there is all the more strength in the view that the Time Convention should give friendly aid and support to the Superintendents' Association. An abstract of the decisions of the Train Rule Committee, with the reasons on which they are based, such as we have just suggested, would be a valuable thing in the meetings of the lower association; but it would be still better to have a member of the committee present in person to explain the points brought up. He could defend the action of the committee where it needed defense, explain it where it was based on mere expediency, and perhaps give light concerning some rules which are not susceptible of rational defense; and could carry back to the committee such items as merited further attention from that body. Several questions concerning rules have already been referred from the lower to the higher association, and it cannot be said that they are unworthy of consideration. It is no more than fair, and it is for the best interests of the railroad service generally, that the advocates of the possible changes here involved be given a chance to argue their points at length. A short report from the Train Rule Committee, such as has been given in one or two instances, saying in brief language that objections have been presented to a certain rule, and that the committee cannot admit the weight of the arguments presented, can hardly be said to adequately meet the case. It satisfies no one and leaves the same question to be brought up again by some one else.

The first conundrum presented at the New York meeting was this: Westbound train 21 and eastbound second 22 have an order to meet at Greenville; eastbound trains are inferior, and first 22 is delayed and stops short of Greenville because it must do so to clear the time of 21. The station where the stop is made has no telegraph office, and second 22 is therefore held by the first section. Rule 108 does not cover the case, although it would apply if first 22 were physically disabled. Train 21 dares not move because it holds the meet order, and second 22 is indefinitely delayed. It appears that the Pittsburgh, Cincinnati, Chicago & St. Louis has a supplement to Rule 106 which provides for a case of this kind, giving the second section the right to send a preceding section on ahead of it. The proposer of the question wanted this addition to Rule 106 presented to the Time Convention, but this was met by the statement that that body had already considered and rejected such a rule. This is a case where the necessity of a standing explanation of the committee's action is needed. Apparently the principal objection to this rule of the Panhandle is that it cumbrous the code and introduces a complication which a majority of the committee regarded as not of sufficient value to pay for the added labor in explaining and risk in using the rule. But the question comes up whether the committee expect, in a case of this kind,

that the crews are to stretch Rule 108 by swapping orders when the engine is not disabled; or, whether they shall "make believe" that the engine is broken down when it is not; or take some action outside of the rules. Most railroad men regard it as axiomatic that a conductor shall always have the privilege of flagging himself out of any possible dilemma, and it is claimed that nothing could be easier in this case than for first 22 to send a man with a flag on second 22 to hold 21 at Greenville. Some of the speakers at the meeting were inclined to blame the dispatcher for getting into such a scrape; but these arguments were not well sustained, and it is plain that with telegraph offices far enough apart the difficulty might occur under the most careful dispatcher. The use of form C, reversing the rights of the trains, was advocated, but there seemed to be no one ready to say that such was positively the best practice.

The next conundrum was concerning Rule 20. The question was whether a new train, starting from A at 11:45 p. m. and passing B at 12:01 a. m., when the new table goes into effect, should be recognized at C by an inferior train moving in the opposite direction on the first day of the new table (Sunday). The train has no right on the road between A and B under the old table, but if it is run as an extra over this section some conductor will assume that it was not intended to start on its first trip until Sunday night, and will therefore ignore it. Readers will recollect that a somewhat different problem under this rule was presented in the *Railroad Gazette* of July 25 last. In this case, as in that, the true remedy is doubtless to require the dispatcher to fully provide for all such emergencies. It should be remembered in discussing the Standard Code that that work does not pretend to cover all the duties of the dispatcher and trainmaster, and no one expects the rules to work automatically. It was stated at the meeting that some roads found it impossible, in putting on large numbers of summer passenger trains, to change time at an hour when few or no trains were on the road; but if the number of new trains in any case is too great for the dispatcher to readily handle, it would seem perfectly feasible to clear all doubts by a note on the time table. But howsoever great the work thrown on the dispatcher or the time-table maker, no intricate questions should be left for conductors and engineers to solve. Rule 121 is useful and necessary, but when conductors are found refusing to move because of its requirement, the trainmaster or other officer involved should at once ask himself if there is any blame at his own door.

One of the questions formally referred to the Time Convention was that concerning Rule 92, the language of which implies that a train may, at meeting or passing points, arrive at a station in advance of its schedule arriving time. This is evidently a case where the committee sacrificed accuracy to the demands of "practical railroadng," under which it is deemed necessary to have an arriving time to make appearances right, while yet allowing the train to "hustle" where it is deemed necessary to do so. Nevertheless, it seems self-evident that an arriving time, if named, should be adhered to.

The difficulty of enforcing Rule 48 was next brought up. It will be remembered that the committee, in its report, states that some of the members regarded this rule as unnecessary; and this discussion well illustrated the fact that opinion is still thus equally divided. The point made is that, where the rule is used, an engineer waiting on a side track, and at work beneath his engine, would make no effort to see the signals on a passing train, depending wholly upon the whistle signal. By indulging this habit he would soon come to neglect giving the answer, according to Rule 42, and thus delay passenger trains, as the engineer of one of the latter could not properly do otherwise than stop when he failed to get the acknowledgment. It appears that some roads using Rule 48 require the answer, according to Rule 42, to be given on single track, but not on double. This practice would seem to disregard the fact that some of the dangerous mistakes which Rule 48 is designed to correct have occurred on double-track roads, a freight train pulling out of a side track between two sections of a passenger train, all moving in the same direction. Some roads do not require the answer to be given in any case.

A difficulty in the use of Rule 62 was presented by a superintendent who has long-armed men and short-armed men. A large circle was given at the rear end of a long train which had broken in two at the 41st car from the engine; the signal was taken for a small

circle and the engineer backed up. But according to Rule 61 the small circle is for use only when a train is standing, and it was not explained how the engineer came to be at a standstill while the rear portion of the train was moving toward him. If the rear brakeman gave the train-parted signal while the train was standing he clearly disobeyed the rule, and if he gave it while the parts were moving so slowly that there was no danger of collision he would seem to have used very poor judgment.

Superintendent Turner, of the P., C., & St. L., spoke of the necessity of modifying Rule 103 where a train is partly equipped with air brakes. As has already been shown in the accident records of the past year, a long train in which, say, half a dozen cars at the front are braked by power, is sure to suffer some damage if it breaks apart at any point forward of the sixth car when running at considerable speed on a level or descending grade. Mr. Turner has issued an order directing the non-observance of Rule 103 in a case of this kind. His air-brake instruction train consists of 25 cars, and one of the object lessons taught by means of it is arranged to illustrate just this point. The air is shut off from all but the five forward cars, and the train is then broken behind the fourth car. The engineer, as soon as he feels the brake go on, at once shuts off steam, and the inevitable collision is thus made as harmless as possible. None of the experiments have yet done any damage.

Concerning Car Heating.

As the result of considerable inquiry into the present state of business in the matter of steam heating of trains we conclude that but little is doing compared with what ought to be doing at this time of year. The Pullman and Wagner companies are extending the application of steam heating to their cars, and, of course, the "Vanderbilt" roads are pushing toward completion the equipment of all their trains. We say "of course," because, as is well known, those lines were forced by the New York law to use steam heat in that state, and the advantages of the system in itself, and of uniformity on through cars, have put the Vanderbilt lines, as well as the New York lines generally, ahead of the rest of the country in this matter. In Northern New England also the equipment of the passenger stock will soon be complete, and in Canada the use of steam heating is extending. Aside from the regions and the lines mentioned, there seems to be little inclination now to extend the use of the systems of heating by steam from the locomotives. Most of the roads seem to be inclined to rest where they are, with but a small part of their passenger equipment fitted; and what is still more strange, there are still a good many which do not even pretend to make general use of the Baker, or other safety, heaters.

This is particularly true in the West. A startling condition of things can be seen on some of the suburban cars running out of Chicago. In the evening and morning one may see dozens of them filled with people—not only are the seats filled, but also the aisles. Standing in the middle of the car, and looking over the heads of the passengers, one may see at the end of the car a common cast iron stove of the most worthless pattern, with a pile of wood adjacent, not unlike what may be seen in a grocery at a country cross-roads. Those cars bring to mind some of the immortal sayings of indiscreet railroad officers, as, for instance, "I would rather carry hogs than commuters," and "the public be damned." The commuter who sits in front of the red-hot wood stove, or in any of the seats near the ends of the car, may sometimes wish he were a hog, but he does not want to be burnt up before he is damned.

We know of one railroad company that has ordered air brakes and M. C. B. couplers for its freight trains and is putting a vertical plane coupler on its passenger trains, and yet makes its local passengers sit beside ordinary three-dollar, cast iron stoves, made in a common foundry and fired with wood. The end of the car looks like a wood shed; it is not only unsightly, but frightfully dangerous, and yet we believe this company has never made a serious investigation or trial of any of the good steam heating systems that may now be had.

Two years ago we doubted the expediency of legislation compelling the use of steam heating, and a year ago we were confident that no such legislation was necessary. The practicability and economy of steam heating were demonstrated and the art had so far advanced that it was certain that all objections could be removed by a little further experiment. We concluded therefore that the added safety, the increased seating room in cars, the improvement in appearance, the adaptability of the system to im-

proved ventilation, and the economy in operation and maintenance would be sufficient inducements to the railroad companies to push on rapidly in perfecting and applying steam heating equipment. Self interest is a safer and more efficient motor than special legislation, when it works, and for that reason we were quite sure that the state and national law makers had better let car heating alone, since self interest seemed sure to push it with wholesome speed. We are not quite so sure of this now as we were a year ago.

It is not easy to understand why steam heating does not get on faster. Many railroads are waiting for the development of the perfect system, as they are waiting for the perfect coupler; but there are to-day several systems in operation that if not perfect, require less trouble to manage and maintain, and are cheaper in operation than the common car stove—certainly where anthracite coal is burned in the cars. There are at least half a dozen steam couplers which are so far perfected as to be on a level with the average railroad device of any sort. The piping is simple, the valves are reduced to only two or three in number, the expansion traps, which gave so much trouble, have been removed generally. Even on the ground of first cost there is no great objection. By large contracts and by furnishing as much as possible of the material used, a railroad company can equip cars for about \$100 each.

Another objection made, and one which has certain weight in very cold climates and where the demands on the locomotive are especially severe, is that the locomotive cannot spare the steam. In ordinary conditions this is not a valid objection. The amount of steam taken from a locomotive to heat a very long train is only 10 per cent. at a maximum, and for an ordinary train it is not over five. Of course, there are times, on grades and in difficult places, when some locomotives cannot spare this percentage of steam, but generally a careful engineer can save any difficulty by turning off the steam for a few minutes when there is a heavy grade to surmount or other extra demand is made. Such a condition is not often reached with the newer types of locomotives, as all economical engines have always an excess of steaming capacity, that being one of the essentials of economical operation.

Of course there is still another obstacle to the introduction of steam heating, in the inertia of the human mind. There is a tremendous power in the determination to save the trouble of a change. The car departments dislike very much to upset their general plans for a season by hauling in cars which are in good condition in order to equip them with steam heating devices, and the motive power departments are reluctant to add anything to their own cares. And so, altogether, it looks as if we might expect to hear from the "deadly car stove" for a winter or two yet.

The Cost of Railroad Accidents.

The first and great reason for promoting safety in railroad operation and for striving to shorten the long record of accidents happening on American roads every year is undoubtedly the protection of the lives of passengers and employes. This is not only due as a simple right to the men who conduct the physical operations of railroading and to those who pay their fare with the expectation of being transported safely, but is important in a sense which is not so definitely thought of, but is just as real, that of maintaining confidence in the safety of railroads. This is a vital feature which connects the humanitarian side of the question with the financial side. Many newspapers have discussed the accident record within the last month, and some of them have said that it is best not to travel on a railroad unless one is obliged to. The so-called epidemic of appalling disasters seems to have caused this notion, always present in the minds of some women and country people, to spread somewhat among less nervous or timid people. Such a feeling may not operate to reduce the volume of travel very much or for any great time; but it must have some effect on net earnings. Moreover, the recent notable accidents have occurred on roads of such good general reputation that public sentiment, in its present state, apparently takes little cognizance of the points in which one railroad differs from another in the matter of safety. Those which have made the largest expenditures for perfect track and cars, adequate signals and well-disciplined service are liable to be classed with the poorer roads and to suffer equally with them.

These considerations, the humanitarian aspect of accidents and their effect on passenger travel, are always present in the minds of railroad officers, and have with them greater or less importance, according to their individual make up; but what we wish especially to

speak of now is the class of accidents that occur frequently on the best roads and of which the public hears little. The average manager or superintendent has to investigate freight train accidents about every week, sometimes every day. Expenses for broken draw-bars and other parts of cars, for minor wrecks of various sorts which do little or no harm to persons and which singly amount to no great sum, financially, are always before him. The embarrassing work of dealing with coroners' juries and bereaved widows, and consideration of the demands of public opinion concerning moral responsibility for manslaughter are more infrequent and happily in most cases very rare. By way of showing the cost of the minor and common accidents we give some actual figures from one of our largest roads. Many desirable facts concerning train accidents are wanting in this statement, and its value is therefore somewhat limited; and because of this partial character of the information the name of the company and the actual totals are omitted, but what remains is still very interesting.

On the road in question there were during the company's last fiscal year:

Accidents per mile of road.....	1.485
Accidents per 10,000 train miles.....	.732
Accidents per 10,000 freight train miles.....	1.04
(Freight train miles were 70 per cent. of the whole.)	
Cost of accidents per freight train mile, cents.....	1.69
Of this the amount chargeable to loss of company's property was.....	
.....	1.404
Payments for merchandise lost and damaged, etc.....	.286

Of the total number of accidents the percentages attributable to some of the principal causes were as follows:

	Per cent.
Defects of track.....	4.2
Other faults in roadway.....	6.0
Negligence in operating:	
Collisions (on the open road).....	17.0
Careless switching.....	22.0
Misplaced switch.....	6.0
Unknown.....	3.0
Other causes.....	40.9
Total.....	100.0

The average cost per accident was \$163.

Now the financial deduction from these figures is one of a good deal of significance. The net earnings of the road for the year were three per cent. less than they would have been if these accidents had not occurred.

This is a dividend paying road and one of the safest in the country. In fact, we doubt if there is more than one other road in the land that has so few accidents. Therefore it will be well within bounds to apply these figures to the railroads of the United States.

The freight train mileage of the United States for the last year reported in Poor's Manual was 430,719,732. Multiplying this by 1.69, the expense per freight train mile on the road under consideration, we have \$7,279,163 as the estimated cost of train accidents in the United States for a year. The sum of \$7,953,286 would add 10 per cent. to the dividends paid by the roads of the United States during the same year, as reported by Poor; that is, the total prevention of train accidents throughout the country would, without doubt, add fully 10 per cent. to the profits of the stockholders.

We have made these estimates on the basis of freight train mileage for the familiar reason that the financial loss from such accidents is so much more largely chargeable to the freight service than to the passenger; that is, damage to freight cars and their contents, to engines and track, are so universal and constant, as compared with injuries to persons by train accidents. The figures which we have give no basis for estimating the loss per capita from death or injury to persons in train accidents. They cover merely damage to equipment and track and merchandise lost. The best figures that we can get give 690 persons killed and 1,745 injured by train accidents in the United States in 1889. (For reasons given before, we have no confidence in the accident statistics of the Interstate Commerce Commission.) These figures are undoubtedly too small, but taking them and assuming that each death cost the railroads \$3,000 and each injury cost \$500, including legal expenses, we have in round numbers \$3,000,000. This will give us, say, \$10,000,000 as the total cost of train accidents in the United States in one year. This is 4 per cent. on \$250,000,000, a sum very nearly equal to the total passenger earnings of the railroads for that year, or about 80 per cent. of their net earnings.

Of course we do not think it possible that all train accidents could be prevented by the expenditure of this vast sum, or that the expenditure of a proportionate amount by any one road would put an end to accidents on that road; but we are quite sure that it will pay any road to keep a classified record of its accidents and of their cost, and to spend money liberally according to the lessons of this record.

Cost of Transportation by Rail and by Canal.

The last number of the Publications of the American Economic Association contains two articles urging increased attention to canals. One is by an economist,

Prof. James, of Philadelphia; the other by a civil engineer, Prof. L. M. Haupt. The former draws arguments from European as well as American experience; the latter gives more detailed accounts of the conditions existing in our own country.

Both articles are interesting; but we believe that the methods of comparison employed by the writers are defective, and the results in some measure misleading. The writers compare the cost by rail, including interest and maintenance of way, with the cost by canal when these expenses are remitted. To be fair, we should either include them in both cases, or exclude them in both. The former is obviously impossible; our canals cannot attempt to pay interest and maintenance charges. The effort to levy tolls on the business of the Erie Canal prevented it from competing with the railroads on equal terms. Its present importance is only maintained by making it free.

Let us adopt the other alternative, and see how the expense of freight movement on the New York Central, not counting fixed charges, compares with that on the canal. For this purpose we should omit interest, maintenance of way, taxes and general expenses, and include traffic expenses, motive power and maintenance of equipment. In other words, omit the undistributed expenses, and include the distributed ones. The total of such expenses for the year ending June 30, 1890, was as follows:

Traffic.....	\$9,988,000
Motive power.....	6,448,000
Equipment.....	2,223,000
Total.....	\$18,659,000

Without going into the details of distribution, the proportions due to freight and passenger business respectively are nearly in the ratio of freight and passenger train mileage; that is, about six-elevenths to the former and five-elevenths to the latter. On this basis the freight expense was \$10,200,000. The ton mileage for the year, not counting company's freight, was 2,974,000,000; counting company's freight, 3,159,000,000. On the former basis the cost per ton mile was 0.34 cents; on the latter, 0.32. If we add interest on equipment used, it will make a difference of $\frac{1}{100}$ of one cent in the above figures. The general result is, that the cost per ton mile on the New York Central, leaving out the items which are paid for at public expense for the canal boats, is in the neighborhood of $\frac{3}{10}$ of a cent. The cost on the canal is apparently a little under $\frac{3}{10}$ of a cent; at least this is all that is claimed by its advocates in the pamphlet before us. For this difference of $\frac{5}{100}$ of a cent the railroad furnishes fast transportation instead of slow, transportation all the year round instead of six months only, and transportation in a variety of forms instead of one only.

But the advocates of canals claim that after certain easily conceivable changes the canals could do their business at $\frac{2}{10}$ of a cent a ton a mile. Let us see what the railroads might conceivably do on the same terms as are proposed for the canals. The main line of the Erie Canal cost \$170,000 per mile on capital account; a better canal would naturally cost still more. If the government were willing to spend this amount on a railroad, in any country where a long, first-class canal were practicable, it could build a road which would carry freight in the very largest train loads. If the government paid the maintenance expenses, as it does for the canal, and let the railroad men wait until their trains were as full as they wanted, which is practically what the canal does, they could easily get loads averaging 350 tons net, perhaps 400 tons.

The movement expenses per train mile would be approximately as follows:

Fuel, say.....	10 cents.
Wages, say.....	15 "
Repairs, say.....	15 "

amounting in the aggregate to little over a tenth of a cent a ton a mile on the basis of the train load thus indicated. To this may fairly be added a terminal of $7\frac{1}{2}$ cents a ton at each end, making on the distance from Buffalo to Albany about $\frac{1}{10}$ of a cent a mile additional, or from $\frac{15}{100}$ to $\frac{17}{100}$ of a cent a mile for all the expenses that the canal has to pay. It may be said by the advocates of canals that the government would not have to pay so much for maintenance of a canal as for that of a corresponding length of railroad; but this would be offset by extra interest charges due to the higher first cost per mile.

If this reasoning be correct, railroads are actually a cheaper means of transportation than canals; the apparent advantage of the latter being due to the fact that the government makes the shippers a present of a great many things which they have to pay for on a railroad. Such presents as a rule come out of the pockets of the taxpayers, and are on that account undesirable in themselves; they are doubly undesirable when people think that they are getting a cheaper

method of transportation, but really are getting a dearer one.

There is an immense deal of nonsense talked about a "systematic purpose to ruin the canals" here and in England. The fact is that they have had public favors given them of a kind that the railroads never enjoyed. Not only have their maintenance charges been paid out of the public pocket, but efforts have been made to prohibit railroads from carrying freight in order that the canals might have a monopoly. In spite of all these advantages, the railroads won the fight because they furnished a better and, all things being taken into account, a cheaper method of transportation.

Of course, there are exceptions. The first of these is where a natural water route exists which can be made available for trade at comparatively little expense. The Mississippi River furnishes a case of this kind; the Sault Ste. Marie Canal, forming part of the great lake route, is another and still better instance. Here very cheap freight transportation is obtained by less expenditure than would be involved in the construction of a railroad between the terminal points; so that there is an actual economy in using this method. The maintenance of a canal like the Erie, left over from a former period when it was good economy to build it, can be justified on the same grounds; which, however, do not justify vast expenditures of new capital which, from a public point of view, could be more economically used in railroads.

A second set of cases where canals are profitable is when transshipment is thereby either spared altogether or rendered much cheaper. The Erie Canal owes most of its present importance to the superior facility with which it can handle lake traffic. The demand for a large canal between Manchester and Liverpool arises from the same cause. With the constant cheapening of movement expenses, charges for terminal handling form every year a large proportion of the whole, and anything which can lessen these may prove a source of public economy.

The third set of cases where canals can handle traffic cheaper than railroads is of quite another character. It comes up when railroads are so tied down by legislative restrictions that they are not allowed to do business in the most efficient or economical way. The revival of canals in Germany is largely connected with the fact that the government tries to charge equal mileage rates on its railroads. If a railroad is confined to a system of equal mileage rates it, of course, cannot handle long-distance traffic as cheaply as a canal; but that is the fault of the legislation, not of the railroad. Every act of the legislature which says, "You shall not handle any particular kind of traffic at different rates from what you give to some other kind," prevents the railroad from doing its best in the way of economy. If such acts go too far, they may give canals an artificial advantage in handling some kinds of long-distance traffic, which makes them more available than railroads. It is very likely that this point has been reached in Germany; but we see no reason to believe that we have come anywhere near it in the United States.

Atchison.

The Atchison, Topeka & Santa Fe and its affairs are made the subject of so many dispatches in the daily papers that it is not easy to keep track of them; but it is noticeable that none of these reports are openly vouched for by any one who has authority to speak. The trackage contract with the Colorado Midland between Colorado Springs and Denver is the only visible pretext for the repeated statements intended to convey the impression that the latter road has been bought. The Colorado Midland would doubtless be a good property to acquire, but the Atchison's line to Colorado is not well enough situated as a passenger line to warrant the company in paying a bonus for any advantage it might gain as regards the through business. A transcontinental line needs both freight and passengers if it is to make money. The report about the completion of a line to San Francisco is adroitly phrased; no one holds a man to his predictions about what will happen three years hence. Ten thousand tons of rails will lay only 100 miles of track, and very likely that amount is needed on the Atlantic & Pacific.

The proposed connection between Chicago and St. Louis is 50 miles (18 per cent.) longer than the shortest line and depends for its entrance into St. Louis on a road which has not yet secured passenger terminals in that city. The passenger business is probably more important than the freight between these cities, and neither will be very valuable to a roundabout line; but this scheme involves the building of no new road, and is more likely to be carried out than the others. The Atchison has 1,500 miles of road southwest of St. Louis, and so can control some traffic.

The really important feature of Atchison affairs at present is the fight it is making for business between

Chicago and the Missouri River. The company joins in an agreement for the division of competitive traffic, but it is slow about accepting the decisions of the arbitrators, and the belligerent expressions of its officers indicate that this dilatory action is not accidental. While all the roads are interested in this strife for traffic, its bearings may be most readily grasped regarding the controversy as lying between the two typical roads, the Atchison and the Alton.

The Alton is an old road with established terminals and a good local business, but no line west of the Missouri River. The Atchison is a new line with a slim local business and many facilities yet to be provided, but with thousands of miles of tributary line west of the river; and these lines are not merely marks on the map but really provide a very large share of the traffic that goes east from Kansas City. The only business motive for giving a competitor any of this freight is to get in return west-bound freight which the competitor might otherwise divert, and to keep the peace as regards rates. The Atchison expresses the intention, it is said, of keeping 40 per cent. of the eastbound traffic on its own line. Doubtless it has the power, narrowly speaking, to keep 50 or even 60 per cent., and its claim, therefore, may well seem, in its own eyes, modest. But to the Alton the allowance of such a percentage to an infant competitor seems preposterous, and no one can predict the outcome. Rates yielding little or no profit are a certainty in any event, and the Alton has in the Chicago, Milwaukee & St. Paul and the Chicago, St. Paul & Kansas City two allies which will be powerful in keeping rates low for a long time.

The Interstate Commerce Commission's decision that live hogs must be carried to Chicago, as to other places, at the same rates as lard, salt pork, etc., is evidently based on the simple ground that what is so common elsewhere cannot be far from right in that particular case; and this is probably a just decision. We have not the full text of the opinion, but the points as telegraphed do not seem unreasonable, unless it be the denial of the right to charge less in double-deck than in single-deck cars. Fostering manufactures at the Western termini for the sake of the incidental traffic they will afford is good railroad policy, but is just the kind which public policy is oftenest justified in restricting. The chief argument of the roads, that live stock is more costly and risky to carry and must be hauled in fast trains, ought to have weight, and under normal conditions doubtless would have; but it must be admitted that the difference in price based on this consideration is often larger than the actual economic difference justifies. Hogs sometimes die in the cars, but the loss to the roads on this account is, after all, extremely small; extra work and risk in loading, delivery, etc., are actual items, but how much do they amount to, where the traffic is large? Stock cars have to go back empty, but how much is the money value of the difference between a stock car and a grain car in this respect? When in addition to the question of cost it is remembered that under stress of competition railroads carry "dead freight" at express speed, it is no wonder that all arguments concerning relative cost are brushed aside without much ceremony. "What the traffic will bear" is justly the main question with the Commissioners, and they can hardly be expected to pay much attention to the argument that hogs are carried too cheaply everywhere else but on the lines in question.

Reference was made last week to the Baltimore & Ohio's rule, taking the place of the paragraph in Standard rule 510, concerning the necessity of getting signatures from a superior train before moving an inferior train against it. The Baltimore & Ohio provides for getting two signatures (one beside the operator's) when the conductor and engineer of the superior train are inaccessible. But in addition to this there is a feature which was not mentioned at that time, and that is the form in which holding orders are issued. Form J of the Standard code is, for instance, "Hold No. 2;" on the Baltimore & Ohio such an order must read, "Hold No. 2 at". The reason for adopting this form is found in the liability that the wrong office may answer a call and a train be held at the wrong station. This has been known to occur. While mistakes of this kind must be exceedingly rare, it is certainly wise to provide against them when it can be done so simply. Addressing the order to the operator by name or spelling the name of the station in full in the address would be almost as good a safeguard, but would not be so uniformly easy to carry out. Formerly the characteristic sending of each operator was familiar enough to the dispatcher to provide a quite effectual check against this sort of mistake; but in consequence of the multiplication of offices and increase of the number of operators, the more onerous duties of dispatchers and more frequent changes of both dispatchers and operators, this security is no longer to be depended upon.

A New York newspaper states that the Pennsylvania has abolished the practice of peddling newspapers, candy and other wares on the trains running out of Jersey City, except while trains are standing in the stations; and this is heralded as "the abolition of a nuisance." While a trainboy can easily make himself a

nuisance to the passengers, and often does so, it may well be questioned whether he is not a worse nuisance while a train is loading up in a large station than he is after it gets out on the road and the passengers have got settled. A full-sized man with samples of a dozen different papers, each 18 in. square, spread out before him, or one lugging a basket of candy as heavy as he can lift, is badly in the way when passengers are entering a car with their hand baggage. While such peddlers may be very accommodating in giving up the aisle to passengers when necessity requires it, it is to be remembered that that necessity arises many times on each train during the 10 minutes just before it starts, and there is in the aggregate a large amount of inconvenience.

NEW PUBLICATIONS.

Instruction Book of the Quick-Action Automatic Brake. Westinghouse Air Brake Company, Pittsburgh, Pa.

Catalogue of the Westinghouse Air Brake, 1890. Westinghouse Air Brake Company, Pittsburgh, Pa., and The Westinghouse Brake Company, Limited, London and Paris.

With the introduction into general service of the quick-action brake has come the need of a book which should tell how it is made and how it should be used and cared for; that should be small enough to be conveniently carried and large enough to contain all that inspectors, mechanics and runners need to find in a book; that should be detailed in its descriptions of a somewhat complicated apparatus and should still be compact and clear and within the comprehension of men who are not mechanical engineers, or draughtsmen, or even machinists. The conditions to be filled are pretty hard.

In this little *Instruction Book* of 64 pages are described, not only the construction and manipulation of all the parts of the brake apparatus itself, the quick action and the plain triple valves, the modifications in the application in passenger and freight service, the pump and the engineer's valve, but also the driver brake, the Hodge and the Stevens systems of brake levers, and the train-signaling apparatus. There is also a chapter on brake power, another of instructions on the care of brake apparatus and one on the distance in which a train can be stopped, embodying some of the actual results got with the Westinghouse 50-car train in the fall of 1887. This is a good deal of literature to get into 64 pages, 5½ in. x 4 in., of rather large type. By pretty rigid condensation and the omission of everything not strictly essential it has been very successfully done and the conditions which we stated at the outset have been well fulfilled. Probably a good many readers will wish that a few pages had been added and some matters explained rather more fully.

The subjects are well illustrated in four large folding plates and by two card diagrams with transparent moving discs, particularly explaining the engineer's valve. More space is devoted to this appliance (the engineer's valve) than to any other one topic. The new engineer's valve is of scarcely less importance for perfect braking than the quick-action triple. Indeed, they are correlative, and one belongs with the other; and the Westinghouse Company has endeavored to replace the old valve as rapidly as possible by the more complicated but far more efficient device. But as the new valve is designed to do really finished and delicate work and to take the place of brains to a considerable degree, so it is necessarily a more complex machine than a simple three-way cock, and it is especially important that its mechanism and functions should be understood by engine runners and mechanical officers. To this end, as we have said, considerable space is given to it in the text of the *Instruction Book* as well as in the plates.

In addition to the matter mentioned above, the plates show in detail the M. C. B. foundation brake gear adopted as standard in 1889.

The catalogue of the Westinghouse Air Brake Co. is designed for the use of persons ordering complete sets or parts of brake or train signaling apparatus. It is therefore fully illustrated with numbered plates showing all the parts; but descriptive matter is omitted.

Together with these more important publications the company issues a little eight-page pamphlet called "Don't," and designed to entice the less studious into doing some useful reading. Its style is familiar and personal, and a man can read it when he is lazy or tired, and absorb some useful knowledge without suspecting what is going on inside of his head.

TECHNICAL.

Manufacturing and Business.

We are informed that the British government has sent for samples of the Davies lock spike, with a view to its use on government colonial roads.

Among recent orders for the Mason steam damper regulators are the following: Fitchburg Machine Co., Orswell Mills, Fitchburg, Mass.; Thomson-Houston Electric Co., Lynn, Mass.; the new Pennsylvania shops at Altoona; Ridley Park Water-works, Pa.; Harrison Woolen Mills, Worcester.

The Lewis Foundry & Machine Co., Ltd., of Pittsburgh, has shipped a wire rod mill to the Kilmer Mfg. Co., at Newburg, N. Y., also a 12-in. train for the Atkinson Steel Spring Works, at Spaulding, Ill., and a 9-in. mill to the Illinois Steel Co., at Milwaukee, Wis. The company also reports the receipt of a number of orders for its new hydraulic crane.

Epping, Carpenter & Co., Ltd., of Pittsburgh, are building Duplex pressure pumps for the Colorado Iron & Steel Co. and Pittsburgh Locomotive & Car Works; Epping single pressure pumps for the Hainsworth Steel Co. and the Moorhead-McCleane Co. The firm is also building special Epping boiler feed pumps for Duquesne Traction Co., Allegheny Bessemer Steel Co., Wheeling Steel Works and National Sewer Pipe Co., Ohio.

Mackintosh, Hemphill & Co., Ltd., of Pittsburgh, have shipped to the Pennsylvania Steel Co.'s plant, at Sparrow's Point, Md., two reversing engines 42 x 60 in., and are building nine blowing engines for different parts of the country.

The Simmerly Derrick Co., of Cleveland, O., has become an incorporated concern, under the state laws, with an increased capital. The derrick manufactured was invented by A. N. Simmerly, the superintendent of the company, who was for seven years master mechanic of the New York, Lake Erie & Western.

The Navy Department has decided to award the contract for furnishing the forgings for the batteries of the new battleships to the Bethlehem Iron Works, of Bethlehem, Pa.

The Pittsburgh Steel Casting Co. has placed an order for the Ridgway balance steam hydraulic cranes with Messrs. Ridgway & Son, of Pittsburgh. The first crane will be five tons capacity and 28 ft. radius.

George Lander and J. H. Simpson, department managers of Carnegie, Phipps & Co.'s Union Mills, have patented a forging machine to be operated by electricity, and have assigned the patent to the firm. The machine is intended for the stoving of eye bolts for bridge material.

Iron and Steel.

The Illinois Steel Co. will, early next month, blow in three large blast furnaces at its South Chicago Works. These furnaces are 21 x 85 ft. in size and of 300 tons capacity each. One additional furnace is in course of construction. The new laboratory is nearly ready for occupation. The office building has been furnished, and is occupied.

It is announced that Park Brothers & Co., of Pittsburgh, will establish agencies in European steel markets, and compete for a share of the trade on the finer and higher priced steel.

The Embreeville Iron Co., of Embreeville, Tenn., has awarded a contract to the Pittsburgh Iron & Steel Engineer Co., of Pittsburgh, Pa., for the erection of an iron furnace, and work is to be begun shortly.

The Lackawanna Iron & Coal Co., at Scranton, Pa., is to make extensive improvements at its rolling mill during the winter. A new blooming and billeting train will be constructed so as to be used in the manufacture of steel rails by rolling, and also 4-in. billets of steel, which are used in making wire and rods. A large blower-house will be constructed for additional blowers, and two melting cupolas will be erected.

T. A. Hicks, W. C. Dickey and R. B. Sidell, of Philadelphia, Pa., who recently purchased the rolling mill, steel plant and machinery of the Crown & Cumberland Steel Co., will organize a company under the name of the Cumberland Steel Co.

The Lone Star Iron Co., of Jefferson, Tex., has the building for its car wheel factory completed and the machinery is being rapidly put in place. The firm expects to commence operations about Nov. 1.

The rolling mill of the Portage Iron Co., at Duncansville, Pa., has been enlarged by the addition of 17 more puddling furnaces and another train of rolls. The works now contain 37 single puddling furnaces, six heating furnaces and six trains of rolls. W. G. Merriman is General Manager at Duncansville.

The two new blast furnaces of the Monongahela Furnace Co., at McKeesport, Pa., which have been in course of erection for the past year, are rapidly approaching completion. It is expected that one stack will go in blast in November. The furnaces will have a combined output of 500 tons per day.

The Canton Iron Co. has been incorporated by H. S. Chamberlain, Emell Eastman, O. G. Hurlbut, and others, of Chattanooga, Tenn., to build iron furnaces at Canton, Ga.

The Standard Pipe & Foundry Co. has been organized in Cincinnati with a capital stock of \$300,000, to establish pipe works and iron foundry at Radford, Va. J. N. Gamble, of Cincinnati, is President and W. C. De Armond, Vice-President.

The Lookout Rolling Mill Co., at Harriman, Tenn., has the foundation of the new works under way. The present capacity of the mill is 45 tons a day, but with the proposed additions, the average will be increased to about 70 tons.

The Rail Market.

Steel Rails.—The only sales are of small lots for this year's delivery. There are a number of inquiries in the market, but the mills in most cases decline to make any quotation for next year. Quotations at New York for November and December are \$30; at Chicago, \$32@32.50, and at Pittsburgh, \$30@31, nominally.

Old Rails.—At New York \$25 is bid for tees. At Chicago sellers ask \$27, but \$26.50 is the highest bid. For old steel rails, long lengths, \$22.50 is asked.

Trial of the Steamer F. L. Norton.

This craft made a trial trip on the Delaware River Oct. 16. The vessel is 58 ft. long, with compound condensing engines. It is to be tested by government officers with a view to the use of the system for the life-saving service. The boat has a double bottom, and, it is claimed, cannot be sunk or capsized. About Nov. 1 Captain Norton, the inventor, will sail from New York in this vessel for the Mediterranean.

Proposals for New Ships.

The Navy Department has issued an advertisement inviting proposals for the construction of a harbor defense ram of 2,050 tons, a torpedo boat of 112 tons, and a swift torpedo cruiser of 750 tons. The ram will be constructed from plans of the Navy Department. She will be required to maintain a speed of 17 knots an hour for two consecutive hours, and a premium of \$15,000 will be allowed for each quarter knot in excess of that rate. The torpedo boat will be constructed on plans provided by the bidder, and is to have a speed of 24 knots per hour. For speed in excess of that rate a premium will be allowed of \$1,500 for each quarter knot up to 25 knots, and of \$2,000 for each quarter knot in excess of that rate. The torpedo cruiser will be built on the department's plans, and is required to develop a minimum speed of

22 knots. A penalty of \$10,000 is prescribed for each quarter knot less than 23 knots, and a premium will be allowed at the rate of \$10,000 per quarter knot above 23 knots and up to 24 knots, and of \$20,000 per quarter knot in excess of 24 knots. Bids for the ram and the torpedo boat will be opened Dec. 20, and for the torpedo cruiser Feb. 11 next.

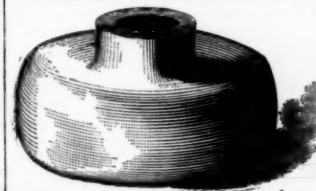
The Double-Deck Ferry-Boat "New Brunswick."

The Pennsylvania Railroad Co.'s ferry-boat "New Brunswick," which was burned to the hull a year or more ago while leaving her slip in Jersey City, has been rebuilt as a double-decker, being the only ferry-boat of that class on the North River. At present she is lying at the foot of Second street, Hoboken, awaiting being placed in commission. The boat is attractive in appearance. The joiner work was done by John H. Hoffmire & Son, of New York. The cabin decorations, which are by Morrison, of New York, are artistic and novel. The floors are laid with English tiling, specially imported for this boat. In the men's cabin the decorations are plain. Those in the women's cabin are much more florid, of papier-mâché; the color is old ivory, gilded. Strips of carpet are laid in front of the seats, except in the men's cabin. A stairway in each cabin, four in all, leads to the upper deck. The upper deck is carpeted in the inclosure. Seats extend around the inside of the inclosure and around the walking-beam box. There is a promenade about 8 ft. wide around the outside.

The old engine, a simple side wheel condensing, built by Robert H. Theall, of New York, is still used, but with some parts enlarged. The original steel boiler is also retained. Steam apparatus will be used, made by Williamson Brothers, Philadelphia. The same apparatus is used on the screw ferry-boat "Bergen." The original dynamo for electric lighting has been replaced by one of greater power, of the Weston design, furnished by the United States Electric Lighting Co. The boat will be heated by an apparatus furnished by B. F. Sturtevant & Co., of Boston. Hot air will be forced by a fan through pipes and out of registers after passing through the heating pipes. To the heating apparatus is attached an automatic Johnson regulator and ventilator, also a Johnson patent thermostat for controlling heat. These are furnished by the Metropolitan Electric Service Co.

Pressed Steel Shapes.

Only very careful readers of technical literature can realize the advances already made in the manufacture of pressed steel in this country. Some of the most complicated forms are now made here more successfully than in Europe. Most of us are familiar with pressed steel centre plates, corner plates, boiler fronts, cylinder head casings, boiler heads, oil box covers and other railroad details, but probably only a few know that much more complicated forms of sheet steel are pressed by succeeding operations to make household utensils, elevator buckets and a variety of specialties in agricultural implements. One of the latest achievements in this line is a steel bottle for a cream separator, a cut of which is shown herewith. This bottle is 1½ in. thick, uniform throughout, weighs 80 lbs., and has only one opening, that at the top. It is made from a plain flat sheet by several operations and finally formed as shown in the cut. This construction has been a boon to



dairymen, as former bottles made of castings of steel and malleable iron were very unsafe when revolving at 7,000 revolutions per minute. The Avery Stamping Co., of Cleveland, O., deserves much credit for its enterprise in making such difficult work. The only other place where these bottles are manufactured is Sweden, and the expense is there so great as to almost prohibit their use.

A Michigan Central Tunnel at Detroit.

The Michigan Central is again considering plans for a tunnel under the Detroit River from Windsor, Ont., to its yard at Ninth street, Detroit. The width of the river is 2,500 ft., and that of the tunnel, with approaches, would be 6,500 ft. A petition was presented to Congress asking for permission to build a suspension bridge, but a commission, which has not yet reported, has decided adversely to the bridge on account of the great traffic on the river. It is estimated that a tunnel large enough to accommodate one track would cost \$3,000,000 and two tracks \$5,000,000. A firm of New York engineers is preparing an estimate of the cost of the work.

The Harvey Steel Car.

During the visit of the foreign engineers to the Illinois Steel Works at South Chicago there was exhibited one of the new Harvey freight cars of the gondola type. This car was built at the Aurora shops of the C., B. & Q. R. R., and is made principally of steel channels placed side by side and clamped together to form sills. The car is 34 ft. long and weighs complete with air brakes and automatic couplers 23,500 lbs., with a capacity of 60,000 lbs. There are several novelties in its construction, such as a new pressed steel draft gear, double end-sills, and steel stakes for the sides of the car. The Harvey Steel Car Company is building works near Chicago at Harvey, Ill., and the side walls of the structures are up ready for the roof. By the first of next year it is expected they will be in full operation.

THE SCRAP HEAP.

Notes.

Committees of employés of the Chicago, St. Paul & Kansas City and of the Chicago, Rock Island & Pacific are demanding increased wages.

The Atchison, Topeka & Santa Fe has appointed a "traveling conductor," whose duties are apparently those of an inspector of train service.

The first electric railroad in Switzerland is about to be opened at Boxholm. The overhead wire system is to be employed, power from a 50 horse-power turbine being used to drive two Westinghouse dynamos.

A cable rack railroad is to be built at Prague, Austria-Hungary, to the summit of the Belvedere. In virtue of the contract entered into, the municipality of Prague is to commence building the road at once, to complete and give it over to traffic within one year, and to operate it for a period of 75 years.

The train staff is used on the Central New England & Western between Maybrook Junction and Campbell

Hall, N. Y., three miles. Both these stations are junctions with other roads where considerable switching is done, and switching engines have to make numerous trips between them. The system is said to be very popular with the trainmen.

The newspapers of Utah and Idaho are giving voice to numerous and loud complaints against the operating department of the Union Pacific, claiming that it is a rare exception for trains to run less than three hours late, that wrecks are frequent and that the track is in very bad condition. The worst complaints refer to the north and south lines.

Mr. Depew to the Engineers.

President Chauncey M. Depew delivered an address before the annual meeting of the Brotherhood of Locomotive Engineers, at Pittsburgh, Pa., Oct. 16, from which we extract the principal paragraphs, as below:

Within a few years everything, from pine lands to peanuts and from steel rails to sardines, has been organized into some form of corporation or trust. This universal effort to absorb the individual, to divide the people into employing companies and employees and to destroy competition will inevitably end in disaster. Hostile legislation and the laws of trade will leave only the legitimate enterprises surviving. There have been several ambitious attempts to form gigantic labor trusts, which should combine under one central and autocratic authority every occupation in which a wage-earner could engage. In all such associations of trades and occupations having nothing in common, certain qualities of audacity, fluency of speech and capacity for manipulating caucuses and conventions, push to the front many men who know little of the great interests confided to their care.

Labor must be as intelligent as capital upon its own grounds. The committee which calls upon the employer or the railroad officer must know its own business as well as he does, otherwise from angry contentions because of ignorance comes the exercise of brute force, and violence fails to secure that which in nine cases out of ten could have been had by intelligent presentation. Hundreds of committees of our employees have been to see me, and I can safely say that after the full and free discussion which always took place not one of them ever went out of my office except to carry back a satisfactory message to their constituents. I do not mean that what was asked was always granted, because an intelligent committee, when it meets the president of the railroad, and sees the other side, always modifies, and sometimes abandons its demands.

The reason for these ready settlements was that the men understood their own business, and knew precisely what they wanted and how much the company could afford to concede. But in the operations of what I may call the labor trust I have had three experiences. A force of fifteen men were located at one point on the line, and in common with other trades in that neighborhood were members of the local assembly. The chief of that assembly was a shoemaker who had a quarrel with a passenger conductor, and to get even with the railroad ordered these men to quit work. They lost their places, with all the attendant misery to themselves and their families, without knowing why they were ordered out; nor have they ever to this day presented any statement. A high official in the order called upon me and I speedily discovered that he knew nothing either of the character of the work, the wages paid, or the hours of service of the people whom he represented. He never had worked an hour upon a railroad in his life. Such representatives of organized labor bring it into disrepute. No matter how able a man may be as a cabinet maker, carpenter or mason, and no matter how competent to represent his own trade, he would be absolutely helpless in endeavoring to argue the claims of a Brotherhood of Locomotive Engineers.

A committee called upon me last fall with a series of complaints and demands, all of which were quickly and satisfactorily adjusted. Then they made a demand for the Locomotive Engineers. I answered that that body was able to speak for itself. They then said that their object was to break up the organization of Locomotive Engineers, and to gather into one organization every department of the railroad service, and that if the management of the Central road would recognize the claims of engineers only through them, this result would be brought about, and upon a much lower basis than the Brotherhood could admit under their rules; and if we did not do so they would strike and tie up the road. I said to them: "I regard the Brotherhood of Locomotive Engineers as the best labor organization in the United States, as a safeguard both to the public and to the corporation against unreasonable demands or intemperate violence, and you may do your worst; but in a matter which affects the Brotherhood, I will recognize only them." That night the officers of the Brotherhood were informed, and the concession made to them, and that threat of a strike was never carried out.

The Foreign Engineers.

We gave last week a report of the first day's doings of the visiting foreign engineers in Chicago. The second day, Tuesday, was spent much as was the first in looking at the various remarkable industries and institutions of Chicago and in social festivities. Tuesday night, Oct. 14, the party left Chicago, some going north and others south, according to the programme. The party which went north went to the Gogebic range and to the Lake Superior copper and iron mines. The party which went south, which was much the larger in number, visited the iron regions of Tennessee and Alabama. Both parties had some experiences which we hope they will not think characteristic of American railroads. The train carrying the northern party jumped the track at a curve near Ironwood, Wis. Nobody was injured. The cars were put on the rails and the journey resumed in a few hours. Two of the members of the southern party were caught on a high trestle near Chattanooga and narrowly escaped being run over. The runner just succeeded in stopping his engine in time.

A Trade Mark Decision.

Messrs. Howson & Howson, patent lawyers, of 38 Park Row, New York City, report a recent decision on the use of the word "Rosendale" as a proprietary title for cement, which embraces a novel point. A concern in Pennsylvania made cement out of stone quarried there, and called it Anchor Rosendale Cement; one of the twenty concerns at Rosendale, N. Y., asked for an injunction forbidding the use of the word Rosendale and requiring an accounting of profits. Justice Bradley, sitting in the Eastern District of Pennsylvania, decides that, if there is injury to the Rosendale manufacturers, there are so many of them that it may be regarded as a public injury, just the same as it would damage all dealers in linens for a man to sell as Irish linen fabrics

that are not such. If a person seeks to restrain others from using a particular trade mark he must show that he has an exclusive ownership therein.

Wagner Vestibule Cars.

The Wagner Palace Car Co. has already altered the vestibules on a number of its cars to conform to the recent decision sustaining Pullman's patents on the face plate and its connections, and other parts. All these appliances are being taken off and the only connection between the cars, above the platform, is a covering made of canvas, stained black. There are two top pieces, and the sides which drop from the car hoods are shirred and allowed to play on rubber bands which are fastened to upright brass rods rising from the platforms to the hoods of each car. The canvas pieces are so adjusted that in case the train should part suddenly certain ends of the canvas sides and top would be released automatically. The new appliance is said to satisfactorily keep out dust and draughts of air.

The Beals Railroad "Safety Shoe."

A shoe especially designed for railroad men working on or around tracks has recently been placed upon the market. The upper of this shoe is constructed upon a new and peculiar pattern, having the goring cut whole, of extra width at the sides and extending around the front of the ankle, thus making the shoe easier to remove than the ordinary Congress shoe, which binds in front of the foot. This shoe has been subjected to experiments with the view of its being worn by track walkers, brakemen, switchmen and other railroad employees who, while walking on the tracks, may catch one of their feet between the rails where foot guards are not used. Should a train be close upon a man in such a situation he is very likely unable, when wearing ordinary lace or Congress shoes, to extricate the foot before the engine or car has passed over and mangled it. It is thought that the shoe in question will obviate this difficulty, as a man wearing it could instantly pull his foot out of the shoe and escape the threatened danger. The Old Colony will soon make a test of this shoe in its yard at Boston in the presence of the Massachusetts Railroad Commissioners and other interested parties. The shoe is manufactured by the patentees, The I. A. Beals Co., of Brockton, Mass.

Running Through a Wreck.

Mr. John Burns, the engineer of the Lake Shore Express train that ran into a freight wreck which had fallen over from the other main track at Silver Creek, N. Y., Oct. 19, is highly praised by the passengers. General Samuel Dalton, Adjutant-General of Massachusetts, said to a Chicago reporter: "I cannot help extolling the bravery of Engineer Burns, who undoubtedly saved the lives of many passengers. It was a terrible experience to him, because he faced the danger, and equally so to the passengers, who only realized at the time that the train began to leap ahead as if possessed of supernatural energy. Burns, crouched behind the boiler head, pulled the throttle wide open, and the iron horse shoved aside the debris and a car loaded with horses as a snow-plow does a light fall of snow. We drove through the wreck and except for a few scratches our sleepers remained uninjured. The windows were ripped from three coaches and a few passengers were badly cut by the flying glass. I shall never forget the sight presented by Burns as he stood beside his engine, cut and bleeding. Our debt of gratitude to that man who saw one chance in a thousand and took that single chance of saving his train can never be paid in money. We made up a purse for him but I assure you that the matter will not end there."

LOCOMOTIVE BUILDING.

The Chicago & Erie has given an order to one of its shops to build two locomotives a month until further orders.

The Chicago & Grand Trunk has ordered ten 8-wheeled engines from the Rogers Locomotive Works.

The Chicago & Eastern Illinois is to replace a large number of its light engines with moguls during the coming year. Probably about 35 in all will be ordered, and five of these before January.

The West Virginia Central & Pittsburgh has recently placed an order for a number of new freight engines, and the Toledo, St. Louis & Kansas City will probably soon order new equipment.

The Southern Pacific has ordered six locomotives for its eastern division.

The Huntington & Broad Top will soon contract for two new engines.

The Baldwin Locomotive Works have recently received an order for two freight locomotives for export to the Cape Colony government road.

CAR BUILDING.

The New York Railway Supply Company reports the sale of 50 hopper bottom coal cars built by the United States Rolling Stock Company for a Southern road.

Some of the car building firms on the line of the Pennsylvania road are reported to have been asked to bid on two or three hundred cars for that road.

The Roanoke Machine Works, of Roanoke, Va., are working on a large order for gondola cars for the Norfolk & Western.

The Jackson & Sharp Car Co., Wilmington, Del., has delivered six passenger cars to the Georgia, Carolina & Northern.

The New York, Susquehanna & Western is in the market for about 50 box cars, and the Philadelphia & Reading is also reported to be about ordering a large number of freight cars.

The New York, Ontario & Western will let the contract the latter part of the present week for the building of 500 25-ton gondola coal cars, the successful bidder to have an option on 500 more if ordered before next January. The specifications provide that the cars shall be 29 ft. long, from outside to outside of sills, and 8 ft. 5½ in. wide. The following are also specified: Cast iron dead blocks; 16 Schoen hot pressed steel stake pockets, and the Diamond truck, both New York, Ontario & Western standards; Butler drawbar attachment; spring covers on oil boxes; King's flexible side bearings; and pressed steel truck centre plates. The cars will have M. C. B. automatic car couplers.

The East Tennessee, Virginia & Georgia has ordered 500 fruit cars for the Louisville Southern Division. This is in addition to the order for 1,000 iron cars noted last week.

The St. Louis, Arkansas & Texas has just put in service on the daily express train between St. Louis and

Waco, Tex., two elegant passenger cars built by the St. Charles Car Co. Four more cars of the same design will be added to the service as soon as the finishing touches have been given at the works. The exterior panels are finished in olive, and the interior presents a bright surface of mahogany. The Scarritt reversible high-back seats are used. These can be arranged to furnish accommodation for parties of four with a table between. Another advantage is a roomy compartment at one end for smoking, fitted up with five seats. The same firm has recently finished at its shops, for a traveling museum, four museum cars, with the bodies painted in white and resplendent in varnish and fantastic gilt designs. One car is to contain the electric light plant that is to light the museum train. A fifth car contains the dining and culinary departments. The gliding alone cost \$800 per car. The idea is to run the train into a town, and have the exhibition on the cars. The four coaches cost about \$24,000. They were built for the Coup Museum Co., of Chicago.

The New York, Lake Erie & Western let a contract this week for 14 passenger and six combination cars to the Barney & Smith Mfg. Co., of Dayton, O. The cars will be fitted with Forney seats and will be lighted by the Pintsch gas system.

BRIDGE BUILDING.

Albany, N. Y.—The State Superintendent of Canals has awarded the contract for the superstructure of a wrought iron bridge east of lock 41, on the Erie canal, to the Groton Bridge Co. for \$2,070.

Augusta, Ga.—At a recent meeting of the City Council a contract was awarded to G. H. Crafts, of Atlanta, to build the Harrisburg iron bridge over the Augusta Canal, near the large cotton factories. The contract is for \$11,800.

Chicago.—In our issue Oct. 10 we stated the city of Chicago had let the contract for the superstructure of the Weed street bridge over the North Branch Canal to the King Iron Bridge & Manufacturing Co. of Cleveland. This was an error, as the contract for the substructure and superstructure was awarded to Shail & Schnigla and has been executed.

Cleveland, O.—It is proposed to erect a new bridge in this city over the Central Way. The City Engineer will prepare the plans.

Coburg, Or.—The Pacific Bridge Co., of San Francisco, has begun the erection of a railroad bridge across the McKenzie River at Coburg. The bridge is to be built of wood, and will be the longest wooden bridge in that region, having a centre span of 250 ft. and a 60 ft. span at each end. The piers will be of concrete on piles.

Dalton, Ill.—The Chicago & Western Indiana will probably build an iron bridge, to cost between \$40,000 and \$50,000, over the Little Calumet River near Dalton.

Freytown, Pa.—The Penn Bridge Co., of Beaver Falls, has been awarded the contract for the iron work of the iron bridge over the Little Swatara Creek, near Freytown.

Golden, Col.—The bridge which will cross Clear Creek half way between Golden and Boyd's Bridge will be completed this month. The contractor is G. Breene.

Greensburg, Pa.—Proposals have been invited for a new superstructure for a low truss iron bridge at this place by the County Commissioners.

Kansas City, Mo.—The Board of County Commissioners has authorized the erection of a bridge on the Leavenworth County line, in Prairie Township.

Lafayette, Ga.—The following were the lowest bids for the building of an iron bridge across West Amichee Creek received by R. N. Dickerson: George H. Crafts, Atlanta, Ga., \$1,908; King Iron Bridge & Mfg. Co., Cleveland, O., \$1,895; W. H. Converse, Chattanooga, Tenn., \$1,875; Milwaukee Bridge and Iron Works, Milwaukee, Wis., \$1,930.

Little Britain, Pa.—The County Court is examining a project to build a bridge over the Octoraro River between Lower Oxford and Little Britain.

Lockport, Ill.—R. D. Wheaton & Co., of Chicago, have been awarded the contract for the construction of an iron bridge at this point, at \$9,595.

Milwaukee, Wis.—The plans for the new iron and steel bridge on North avenue have been completed by the City Engineer. The structure will be 522 ft. long, exclusive of the abutments, and 30 ft. high. The cost of the structure is estimated at about \$30,000. The Whitefish Bay Railroad Company will erect the bridge, but the city will pay one-half of the cost.

Napa City, Cal.—The City Engineer has been instructed to prepare plans and estimates for a new bridge over the river at Third street.

Philadelphia.—A petition has been presented to Councils for a bridge over the Pennsylvania Railroad, on the line of Oxford street. It was numerously signed by residents.

Pineville, Ky.—The West Virginia, Pineville & Tennessee Railroad has advertised for bids for the construction of an iron bridge across the Cumberland River, estimated to cost \$40,000.

Pittsburgh, Pa.—The Oliver Iron & Steel Co. will take charge of the Iron City Bridge Works of C. J. Schultz, of that city, and fill all contracts that were on hand when the assignment was made several weeks ago. The Steel Co. is the principal creditor of the concern.

Roanoke, Va.—The Roanoke Development Co. organized at Roanoke, will soon advertise for bids for two iron bridges across the river, at Roanoke. Arthur C. Denniston, of Philadelphia, is President, and W. S. McChannahan, is Secretary.

St. Paul, Minn.—The Board of Public Works has rejected the bids for the superstructure of the Sixth street bridge. All bids exceeded the engineer's estimate, \$133,000, except that of the Chicago Forge & Bolt Co., which was irregular.

Sherman, Tex.—The County Commissioners of Grayson County have been asked to build a bridge at Whitesborough.

Williamansett, Mass.—Edward S. Shaw, Consulting Engineer of Boston, has prepared plans for the proposed bridge at this point.

Youngstown, O.—The plant of the Youngstown Bridge Co. is being operated double turn. Employment is given to 115 men. The most important contract at

present is for a bridge at Wheeling, W. Va., with a viaduct 750 ft. long and four spans of 200 ft. each.

Zanesville, O.—Proposals are wanted until Nov. 11 for the construction of a bridge across the Muskingum River, by J. A. Knight, County Auditor.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In the Supreme Court of the United States it is laid down that where a railroad company in debt leases its road and properties for 999 years to another corporation, which agrees to pay all judgment liens against the lessor, and to complete its road, and the two companies execute a deed of trust to secure bonds of the lessor, the proceeds of which are received by the lessee, and partly used for its own benefit, the lessee is in equity held liable for debts which existed against the lessor before the lease, though they were not reduced to judgment. This liability is not affected by the subsequent expenditure by the lessee, on the lessor's road, of an amount greater than the amount so misappropriated.¹

In Pennsylvania a railroad laid its track along a city street under an ordinance authorizing the construction of "a single track railroad for ordinary railroad uses, with suitable and necessary turn-outs into and upon the warehouses and wharves." Afterwards, in a suit brought by abutting land-owners, a decree was entered by consent which directed that the railroad company should lay "a single track only, without sidings for standing or passing trains," and should "at no time construct any such switches or turn-outs" on said streets. The Supreme Court holds that this decree did not forbid the railroad company from constructing a turn-out connecting its track with a warehouse.²

The Kentucky Court of Appeals rules that under the statute of 1870 declaring that if more than one question of taxation is voted on at any one election such tax shall be void, an election upon county subscriptions to the capital stock of two different railroad companies, at the same time, is void. And the tax is not validated as to one of the subscriptions by the fact that it is void as to the other.³

The Supreme Court of the United States lays it down that where a person purchases of a railroad company part of a series of bonds secured by a mortgage on its road, under an agreement with the company that no more of the bonds shall be issued, he is entitled to have such bonds paid out of the proceeds of a sale under the mortgage, in preference to bonds subsequently issued to purchasers with notice of the agreement, but not in preference to *bona fide* purchasers, where the agreement, though recorded, is not required to be by law, nor made to constitute notice, and no intimation of it is contained in the mortgage.⁴

In the same Court it is laid down that land which is owned by a railroad company, and which it expects at some future time to use for railroad purposes, but which it has held for five years without using it in any way, is subject to condemnation for the right of way of another company.⁵

Carriage of Goods and Injuries to Property.

In Michigan the Supreme Court holds that where a common carrier is accustomed to deliver goods transported by it to a warehouseman, who is independent of the carrier, and by whom the consignees are notified of the arrival of such goods, and the consignees are aware of the custom, and have long acquiesced in it, the liability of the carrier ends with the delivery of the goods to the warehouseman, and no recovery can be had against the carrier for their subsequent destruction by fire.⁶

The Supreme Court of Mississippi decides that in an action by the assignee of a bill of lading against a railroad company for failure to deliver part of the items mentioned therein, it is a good defense for the railroad company to show that it gave the bill of lading on delivery to it of a warehouse receipt authorizing the delivery to it of the items mentioned therein, and that only those items were delivered to it which it afterwards delivered to plaintiff.⁷

In Pennsylvania the Supreme Court holds that though the consignee has refused, under a mistake, to receive goods from a carrier, he may maintain an action for a refusal to deliver them upon his subsequent demand, when they are still in the hands of the carrier, and no other rights have intervened.⁸

In Mississippi, in an action against a railroad for obstructing water-courses and causing plaintiffs' land to be overflowed, it appeared that two streams ran through the plaintiffs' land, and crossed defendant's roadbed, and that in one of them defendant erected and maintained for a few years a bulk-head which diverted the course of the water, and threw it on plaintiffs' land. Defendant also cut a ditch with its open face next to its road-bed, and threw up a levee across the entire western border of plaintiffs' land, which caused the water from both streams to be thrown back on the land; and, in repairing its trestles used for the outflow of the streams, defendant cut off the old piles which supported the trestles above the surface of the water, and left them to catch the drift, leaving but a small channel for the escape of the waters. The Supreme Court decides that the company was liable for the injury, though the flow of water and accumulations in the streams were increased by natural causes, such as the clearing of the land and loosening of the soil by cultivation.⁹

In Illinois the Supreme Court holds that a railroad which builds its road across a natural water-course is bound to make provision for the discharge of all water that may flow through such water-course, though the amount of such water be afterwards increased by the construction of drainage ditches.¹⁰

In Wisconsin, in an action against a railroad for negligently starting a fire on plaintiff's land, defendant's evidence tended to show that its section men were burning off its right of way on plaintiff's land; that after they finished they kept a man there overnight to watch; that on the next day several stumps were still burning, and that it was windy, and started the fire on plaintiff's land, but that it was put out by the sectionmen; that in the afternoon a rain put out all the fires except one, which was put out by the men; that there were no signs of fire for several days afterward, until it was seen on plaintiff's land. Plaintiff's evidence tended to show that defendant started the fire on a very dry day; that he protested against it several times; that at no time was the fire entirely out, but lingered in old logs and stumps; that he himself attempted to extinguish it but failed; that he examined the stumps every morning; and that they were smoking the morning of the day the fire started on his land. The Supreme Court holds the company liable.¹¹

Injuries to Passengers, Employees and Strangers.

In Massachusetts the Supreme Judicial Court rules that in action for railroad fares, where defendant's ticket has been refused on the ground that the time for which it was valid had expired, it is no defense that he purchased it in another state, by whose laws it had not yet expired, where such laws have been construed by the court of last resort of that state to apply to transportation within its boundaries only.¹²

In Georgia it is held by the Supreme Court that it is a question for the jury whether or not it is negligence to lock the door of the privy on a railroad car, leaving no person in attendance to unlock it, and stopping the car over an opening 20 ft. in depth without giving notice to the passengers of the danger to which they would be exposed if they attempted to leave the car.¹³

In Mississippi the plaintiff's husband bought for her a regular ticket, to be used on a freight train with passenger coach attached, which was run under special regulations posted at the stations, to the effect that the train could not be required to stop at the platforms of stations to take on or put off passengers. Special tickets, in accordance with such regulations, were sold for this train, but the agent at the time had none on hand, and the husband was acquainted with the regulations. Plaintiff and her husband waited on the platform for the train to be pulled up, not because they expected it to do so as a custom, but because they had been informed by a bystander that he had requested the conductor to do so, and the train went off and left them. Plaintiff then bought another regular ticket for the passenger train, which did not pass till night, and brought an action against the company for damages. The Supreme Court rules that, as the regulation prescribed was a reasonable one, plaintiff was not entitled to recover.¹⁴

In Texas, as the plaintiff was about to drive across defendant's tracks, after having exercised due care to ascertain the approach of trains, the sudden approach of a train which she had not noticed frightened her horse, in consequence of which she was thrown from the buggy. The Supreme Court rules that an instruction that, "if the train was running at a rate of speed greater than that limited by an ordinance of the city, and in excess of what an ordinarily skillful and prudent man engaged in the business would employ, in view of the probable danger at the crossing, and if, in consequence of this speed, the train came so close to plaintiff's horse that plaintiff was thrown from the buggy in consequence of the horse becoming frightened, and plaintiff did not contribute directly to her injury, then defendant is liable," is correct.¹⁵

In Pennsylvania the Supreme Court holds that though a boy 10 years of age, who was lying across a railroad track just before he was run over, is not accountable for his own negligence, a recovery for his death is precluded by reason of his trespass.¹⁶

In New York while the plaintiff, a car repairer in defendant's employ, was engaged in repairing a car on a side track, an unattended freight car was shunted against the car in front of the one on which he was working, thus driving his car against the one in the rear, causing the bumpers to come together and crush his arm. Plaintiff's signal flag was properly posted at the time, and could have been seen from the switch which entered the track where he was working. The Court of Appeals decides that the question of defendant's negligence was one for the jury.¹⁷

- ¹ C. M. & St. P. R. Co. v. Third Nat. Bk., 10 S. C. Rep., 550.
- ² Appeal of River Front R. Co., 19 Atl. Rep., 356.
- ³ Christian County Court v. Smith, 13 S. W. Rep., 276.
- ⁴ McMurray v. Moran, 10 S. C. Rep., 427.
- ⁵ Colorado E. Ry. Co. v. Union Pac. Ry. Co., 41 Fed. Rep., 293.
- ⁶ Black v. Ashley (Mich.), 44 N. W. Rep., 120.
- ⁷ Hazard v. Illinois Cent. R. Co., 7 South. Rep., 280.
- ⁸ Bacharach v. Chester Freight Line, 19 Atl. Rep., 400.
- ⁹ Mississippi & T. R. Co. v. Archibald, 7 South. Rep., 212.
- ¹⁰ Kankakee & S. R. Co. v. Horan, 23 N. E. Rep., 621.
- ¹¹ Clune v. M. & N. R. Co., 44 N. W. Rep., 843.
- ¹² Boston & M. R. Co. v. Trafton, 23 N. E. Rep., 829.
- ¹³ Wood v. Georgia Railroad & Banking Co., 10 S. E. Rep., 907.
- ¹⁴ Connell v. Mobile & O. R. Co., 7 South. Rep., 344.
- ¹⁵ Gulf, C. & S. F. Ry. Co. v. Breithing, 12 S. W. Rep., 1121.
- ¹⁶ Pennsylvania R. Co. v. McMullen, 10 Atl. Rep., 812.
- ¹⁷ Murphy v. New York Cent. & H. R. R. Co., 23 N. E. Rep., 812.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

- Baltimore & Ohio, 5 per cent. on the stock of the Washington branch, payable Nov. 1.
- Great Northern, 1 per cent. on the preferred stock, payable Nov. 1.
- Wheeling & Lake Erie, quarterly, 1 per cent. on the preferred stock, payable Nov. 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

- Alabama & Vicksburg, annual, Jackson, Miss., Nov. 3.
- Baltimore & Ohio, annual, Baltimore, Md., Nov. 17.
- Boston, Revere Beach & Lynn, annual, Boston, Mass., Nov. 20.
- Boston, Winthrop & Shore, annual, Boston, Mass., Nov. 20.
- Buffalo, Rochester & Pittsburgh, annual, 36 Wall street, New York City, Nov. 17.
- Central Massachusetts, annual, Room 15, Boston & Lowell passenger station, Boston, Mass., Oct. 29.
- Cincinnati, Sandusky & Cleveland, special, Sandusky, O., Oct. 29.
- Cincinnati & Springfield, special, Grand Central Depot, Cincinnati, O., Oct. 29.
- Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, O., Oct. 29.
- Duluth & Winnipeg, special, Duluth, Minn., Oct. 25.
- East Tennessee, Virginia & Georgia, annual, Knoxville, Tenn., Nov. 19, and special, Knoxville, Tenn., Dec. 6.
- Knoxville Belt, special, 126 Gay street, Knoxville, Tenn., Nov. 1.
- Knoxville, Cumberland Gap & Louisville, special, 126 Gay street, Knoxville, Tenn., Nov. 1.
- Knoxville Southern, special, 126 Gay street, Knoxville, Tenn., Nov. 1.
- Louisville, New Albany & Chicago, special, 47 Broadway, New York City, Oct. 29, to consider proposed extensions.
- Manhattan (Elevated), annual, 71 Broadway, New York City, Nov. 12.
- Milwaukee & Northern, special, Milwaukee, Wis., Nov. 12.
- New Orleans & Northeastern, annual, New Orleans, La., Nov. 5.
- New York & Northern, annual, 32 Nassau street, New York City, Nov. 12.

New York, Lake Erie & Western, annual, 21 Cortlandt street, New York City, Nov. 25.

Wabash, special, St. Louis, Mo., Nov. 25.

Wisconsin Central, annual, Milwaukee, Wis., Nov. 5.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The New England Railroad Club meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Rookery Building, Chicago, at 2 p. m.

The New York Railroad Club meets at its rooms, in the Gilsey House, New York City, at 7:30 p. m., on the third Thursday in each month.

The Central Railway Club meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The Northwest Railroad Club meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The American Society of Civil Engineers holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The Western Society of Engineers holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Wednesday in each month.

The Engineers' Club of St. Louis holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The Engineers' Club of Cincinnati holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the Southwest holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers and Architects holds regular meetings at 30 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Association of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Association of Manufacturers of Chilled Car Wheels.

The annual meeting of this association was held in New York on Wednesday. The chief business before the meeting was the election of officers and a conference with a Master Car Builders' Committee on the guarantee of car wheels.

Boston Society of Civil Engineers.

Oct. 15, 1890.—A regular meeting was held at 7:45 o'clock at the American House, Boston, Vice-President McClintock in the chair; 51 members and 14 visitors present.

Messrs. Charles F. Baxter, Frank A. Bayley, Charles A. Bowman, Benjamin F. Goodnough, Ernest G. Hopson and Arthur C. Moore were elected to membership.

The Society refused to ratify the amendments to the constitution of the Association of Engineering Societies proposed by the Board of Managers by which the scope of the Association would be enlarged.

Mr. E. S. Dorr exhibited and explained a practical diagram for the rapid determination of the approximate sizes of sewers.

Mr. A. F. Noyes gave an account of the water supply of Newton, Mass., and explained, in general, the plan for enlarging the works. Mr. H. D. Woods followed with a detailed description of the covered reservoir and filtering conduit now under construction in that city.

Mr. H. H. Carter read a paper giving the history of the settlement of the embankment between Squantum and Moon Island built for the main drainage works of Boston. Careful observations have been made of the settlement of this embankment, extending over a period of more than nine years, and the bank is now believed to have reached such a condition as to render it safe to build the masonry sewer.

Civil Engineers' Club of Cleveland.

A regular meeting was held Tuesday evening, Oct. 14. Prof. Charles H. Benjamin and Mr. James W. Gallup were elected active members.

Mr. J. H. Sargent read a paper upon "Railroads, Past and Prospective," giving a very entertaining account of the development of the modern railroad from the stone tramways as found in ancient ruins, and noting especially the more rapid stages that he had personally observed since he began his professional career, and predicting that in the near future trains will be moved by that imponderable, unseen, and but little understood agent—electricity.

The reading of the paper was followed by a discussion in which a number of members described their personal experiences. Mr. Robison described a projected electric road between New York City and Philadelphia, on which it is proposed to dispatch light trains from the

terminals every 10 minutes, and make the trip in about 40 or 50 minutes.

Mr. J. B. Larned gave a description of the Grand Avenue Bridge at St. Louis, which is of the stiffened suspension type, with an upper tension cable of steel eye bars, and a lower one parallel to it, but built for compression and triangular bracing between. This was followed by a brief description of the new cantilever bridge over the Ohio River between Cincinnati and Newport, now building.

Roadmasters' Association of America.

The Executive Committee has named the following subjects for presentation at the Minneapolis Convention, to be held the second Tuesday in September, 1891. The committees are also appointed, as follows:

Frogs.—James Sloan, James Ryan, Timothy Hickey, P. Nolan, C. E. Jones, W. H. Courtney, J. A. Kerwin.
New Joins.—B. Mertaugh, Geo. E. Daggett, C. E. Marvin, J. A. Prentice, M. J. McInarna, J. H. Preston, Alexander McGregor.

Interlocking Devices and Position of Guard Rail at Derailing Switch.—R. Black, W. H. Stearns, J. Wynn, C. N. Comerford, J. H. K. Bergwin, J. W. Offutt, G. M. Brown.

Track Jacks.—J. M. Meade, J. D. Mandeville, F. C. Clark, F. X. Galarneau, Mike Shea, N. A. Freeland, D. P. Beatty.

Best General Methods of Doing Track Work upon the Various Kinds of Ballast.—O. F. Jordan, C. H. Cornell, J. E. Dorsey, J. C. Ryan, S. H. Brown, H. D. Hanover, J. B. Gilchrist.

What is Considered to be the Best Proportion of Chemicals Found in the Steel Used in the Manufacture of Rails; Also, Weight and Cross Section Necessary to Secure the Best Results?—R. Caffrey, William Riley, J. E. Cox, P. H. Loftus, William Wright, C. Buhrer, Jas. Schofield.

Which Mode of Laying Rails Will Give the Better Results, Broken or Even Joins?—John Sloan, James Bolan, P. K. Roach, A. J. Diddle, J. R. Patch, D. H. Lovell, J. H. Linsley.

Trainmen's Convention.

The seventh annual convention of the National Brotherhood of Railway Trainmen opened at Los Angeles, Cal., Oct. 20. The annual report of the Grand Secretary shows an increase in membership of 600 during the last year, its present strength being 14,057. There have been organized during the year 63 new lodges, making a total of 367. Disability and death claims to the total of nearly \$275,000 have been paid during the year. It is stated that 130 of the deaths resulted from coupler accidents.

PERSONAL.

—Mr. A. F. Priest, Master Mechanic of the Eastern Minnesota division of the Great Northern, tendered his resignation on Oct. 1.

—Mr. G. A. Carr, formerly Superintendent of the Cincinnati, Hamilton & Dayton road, has been appointed General Superintendent of the Pittsburgh & Lake Erie.

—Capt. P. A. Hill, Chief Engineer of the Oregon Improvement Co. in charge of the building of the Port Townsend Southern and Seattle & Northern roads, has resigned his position.

—Mr. Leverett S. Miller, Assistant Superintendent of the New York, Providence & Boston, having accepted a position as Engineer on the St. Paul & Duluth road, the office has been abolished.

—Mr. W. E. Turrell, Superintendent of Motive Power of the Cleveland, Cincinnati, Chicago & St. Louis, has resigned that position. Mr. Turrell held a similar position on the Cleveland, Columbus, Cincinnati & Indianapolis before the consolidation.

—Mr. W. W. Manning, who has been Engineer of Maintenance of Way on the Pittsburgh Division of the Baltimore & Ohio, has resigned that position, having been appointed Chief Engineer of the Staten Island Rapid Transit Co., to succeed the late Charles Ackenheil.

—Mr. William Irving, General Purchasing Agent of the Chicago, Burlington & Quincy, has resigned that position, to take effect Nov. 1. He is to engage in business in Colorado. Mr. George Hargreaves, who has been Purchasing Agent of the Chicago, Burlington & Northern, has been appointed Mr. Irving's successor.

—Mr. Henry Marks, a director of the New York, Susquehanna & Western and President of one of its branch roads, died in New York City Oct. 20. He was 62 years old. Mr. Marks engaged in railroad operations in his early life, but retired from active business, however, about 25 years ago. A widow and two daughters survive him.

—Mr. Charles W. Keim, Secretary and Treasurer of the Consolidated Coal Co., of Baltimore, died suddenly in that city on Oct. 21. He was a brother-in-law of President Charles F. Mayer, of the Baltimore & Ohio, and a brother of G. DeB. Keim, formerly Receiver of the Philadelphia & Reading. Mr. Keim was also Secretary of the Cumberland & Pennsylvania road.

—Mr. John Houghtaling, who was conductor of the Lake Shore passenger train which was wrecked at Bay View, N. Y., March 6, last, has been tried at Buffalo for manslaughter and acquitted by the jury. Houghtaling's lawyer laid much stress on the claim that a meddlesome passenger caused the stoppage of the front portion of the train, and excited the jurors' sympathy by referring to the fact that Mrs. Houghtaling lay ill at home.

—Mr. Arthur W. Street, formerly Assistant General Freight Agent of the Michigan Central, who was fined \$3,000 for violating the Interstate Commerce law by underbidding freight, has been pardoned by President Harrison. Mr. Street is now Commercial Agent of the Missouri Pacific at Kansas City. Much satisfaction is expressed by his friends at the President's action, many of them feeling that Mr. Street was less guilty than the other persons who were indicted.

—Mr. John W. Ross, Assistant Division Superintendent of the New York & New England, has resigned to accept a position with the New York Central & Hudson River road. Before leaving he was presented with a handsome Howard gold watch and a ring, by employees of the operating and mechanical departments of the Eastern Division. Mr. Ross is still a young man and has been in the railroad service about eight years. His first position was assistant train dispatcher.

—Mr. J. T. Harahan, at present General Manager of the Louisville, New Orleans & Texas, but whose popularity

and wide acquaintance dates from his 22 years' connection with the Louisville & Nashville, has been appointed Second Vice-President of the Illinois Central. This is a new office on the road. Mr. Harahan will have charge of the Operating Department, as did Mr. E. T. Jeffery, whose title was General Manager. This latter office is now held by Mr. C. A. Beck, who was promoted to the position early this year.

—Mr. Stephen A. Caldwell, one of the best known men in Philadelphia financial circles, and President of the Fidelity Insurance, Trust & Safe Deposit Co., died suddenly this week at his home in Philadelphia. Heart trouble is supposed to have been the cause. He was born at Newburyport, Mass., in 1822, of a family that had lived in that neighborhood since 1654. In his early life he was engaged in various business ventures. Since 1841 he had lived in Philadelphia. In 1875 Mr. Caldwell was elected President of the Fidelity Insurance, Trust & Safe Deposit Co., of which he had always been a Director, and for some years Vice-President. He was elected one of the Receivers of the Philadelphia & Reading road, and performed important service in that capacity. He was a member of the Reading Board of Managers until this spring.

ELECTIONS AND APPOINTMENTS.

Chesapeake & Ohio.—The annual meeting of the stockholders of the road was held at Richmond, Va., Oct. 12. Decatur Axtell, of Richmond, was elected a member of the Board of Directors, vice George S. Scott, of New York.

Cincinnati, New Orleans & Texas Pacific.—The stockholders of this railroad met and elected the following board of directors: Samuel Thomas, Calvin S. Brice, John H. Inman, of New York; Charles Schiff, Alexander McDonald, T. T. Gaff, W. A. Goodman, M. E. Ingalls and W. P. Anderson, of Cincinnati.

Dubuque & Sioux City.—At a meeting of the Board of Directors of the company in New York, Oct. 20, E. H. Harriman was elected President in place of W. J. Knight, resigned, the other officers being Vice-President, E. C. Woodruff; Treasurer, Henry de Wolf, and Secretary, A. G. Hackstaff.

At a meeting of the Board of Directors of the road, held this week, E. H. Harriman was elected as President in place of W. J. Knight, resigned, the other officers being: Vice-President, E. C. Woodruff; Treasurer, Henry de Wolf; Secretary, A. G. Hackstaff.

East Tennessee, Virginia & Georgia.—E. Coykendall has been appointed Acting Auditor vice William Hawn, granted leave of absence on account of ill health.

Frederick & Monocacy Valley.—The incorporators of this company, referred to last week, are: L. R. Waesche, Thomas H. Haller, James E. Walker, F. Granville Thomas and Steiner Schley, of Frederick, Md.

Great Northern.—The directors have elected these officers: James J. Hill, President; E. J. Nichols, Secretary and Assistant Treasurer; Edward Sawyer, Treasurer and Assistant Secretary.

Herkimer, Newport & Poland.—A meeting of the old Board of Directors of the road was held at Newport, N. Y., recently. The road has been purchased by M. W. Barse, of Olean, and Henry Patton, of Albany, and Thomas H. de Graw, of Poughkeepsie, and other large lumber operators. Directors J. T. Wooster, of Middleville, and H. G. Burlingame, of Newport, resigned, and M. W. Barse, of Olean, and William C. Prescott, of Herkimer, were elected in their places. Edward M. Burns, of Middleville, who has been President of the company since its organization, has been succeeded by M. W. Barse.

Illinois Central.—Pursuant to the policy adopted a year ago of establishing the president's office in Chicago and of electing additional directors resident in Illinois, the directors of the company this week effected a new organization, and the following officers were re-elected: President, Stuyvesant Fish; General Counsel, B. F. Ayer; General Solicitor, James Fentress; Treasurer, Henry de Wolf, and Secretary, Alexander G. Hackstaff. Two new offices were created—a vice-president, in charge of the treasury and auditing departments, who shall take the place of the president in case of his disability, and a second vice-president in charge of the operating and traffic departments. To the first-named office the Board promoted J. C. Welling, of Chicago, who has for many years been General Auditor and Controller of the company. As Second Vice-President, the Board elected J. T. Harahan, General Manager of the Louisville, New Orleans & Texas.

Kanawha & Michigan.—The following officers of the Kanawha & Michigan road have been appointed: T. M. Peelar, General Superintendent; Clifford Buxton, Chief Engineer; Hudson Fitch, General Freight Agent; Moulton Houk, General Passenger Agent; J. B. Morgan, Master Mechanic. All supplies will be purchased by the General Manager.

Mahoning Valley.—The incorporators of this Pennsylvania company are: J. A. Haskell, Delaware, Pa., President; Adrian Iselin, Adrian Iselin, Jr., and Henry Fates, New York City; J. H. Hocart, Brooklyn; J. A. Haskell, John McLeary, Walter F. Arns, Homer F. Smith and W. J. Webster, Punxsutawney, Pa.

Milwaukee & Northern.—W. E. Tyler has been appointed Commercial Agent, with supervision of this company's freight and passenger business in Northern Michigan, with headquarters at Republic, Mich.

New York, Pennsylvania & Ohio.—The annual meeting of the stockholders was held in Cleveland, O., Oct. 15. The old Directors were re-elected except that Samuel Mather and J. T. Waun respectively succeeded Samuel L. Mather and Thomas Warnock, both deceased.

Northern Pacific.—The annual meeting was held in New York, Oct. 16. The term of the new directors was changed from one year to three years. These directors were elected: Charles B. Wright, Thomas F. Oakes, Roswell G. Rolston, Henry Villard, W. L. Bull, Edwin H. Abbot, Charles L. Colby, Colgate Hoyt, George A. Morrison, C. T. Barney, J. B. Haggin, J. B. Williams and David S. Wegg. The new members who represent the Wisconsin Central, are Mr. Abbot who takes the place of C. C. Beaman, and Mr. Wegg, in the place of C. H. Leland. Mr. Abbot is President of the Wisconsin Central and Mr. Wegg is President of the Chicago & Northern Pacific and the Chicago Terminal Co. The former officers were re-elected. George H. Earl was promoted to be Secre-

tary in place of the late Samuel Wilkeson. The director received the votes of 620,619 shares out of 860,000 share outstanding.

Ohio Valley.—George A. Smith has been appointed General Freight and Passenger Agent of the company, with headquarters at Evansville, Ind., vice A. E. Shrader, resigned.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The following appointments have been made in the freight department: James Means, Division Freight Agent, in charge of the Pittsburgh Division, with headquarters in Pittsburgh; E. F. Fuller, Division Freight Agent, in charge of the Cincinnati Division, with office in that city; S. F. Gray, General Western and Division Freight Agent, with headquarters in Indianapolis; G. W. Davis, Division Freight Agent, Richmond, in charge of Richmond Division and east end of Chicago Division; J. B. Hill, General Western and Division Freight Agent, office Chicago, in charge of west end of Chicago Division; R. W. Geiger, Division Freight Agent, office Louisville, in charge of Louisville Division; Frank Reynolds, General Live Stock Agent, with headquarters in Indianapolis.

Pullman's Palace Car Co.—The annual meeting of the stockholders was held Oct. 16 at the Pullman Building, Chicago, over \$18,000,000 of capital stock being represented. The following directors were elected: George M. Pullman, Marshall Field, J. W. Doane, O. S. A. Sprague, of Chicago; Henry C. Hulbert, of New York, and Henry R. Reed, of Boston.

St. Louis, Collinsville & Carondelet Belt Line.—The incorporators and first board of directors of this company are: S. P. Kellar, Kansas City; E. M. Sloan, A. C. Hart and E. Sutphin, St. Louis; A. M. Powell, H. S. Merrill, O. C. Lock, W. S. Combs, E. G. Gerding, of Collinsville, Ill.

San Antonio & Aransas Pass.—At a conference of the first mortgage bondholders of the company in New York, this week, at which about 70 per cent. of all the bonds were represented, the following were elected a Reorganization Committee: F. P. Olcott, Joseph Wharton, Henry Budge, E. P. Swenson, A. S. Heidelberg, J. Kennedy Tod and Frederick Cromwell.

Seaboard & Roanoke.—The annual meeting of the stockholders of the road was held in Portsmouth, Va., Oct. 21. John M. Robinson was re-elected President, R. C. Hoffman, Vice-President, and Enoch Pratt and Louis McLane, of Baltimore; R. D. Tucker, of Raleigh, N. C.; J. M. Robinson, Jr., of Paoli, Pa., and L. R. Watts, of Portsmouth, were elected Directors.

Toledo & Ohio Central.—T. M. Peelar has been appointed General Superintendent of this road, with office at Toledo, O.

Western Maryland.—The directors of the Western Maryland, Baltimore & Harrisburg, Baltimore & Cumberland Valley, Potomac Valley, Western Maryland Terminal, and Western Maryland Tidewater Railroad Companies met at Hillen Station, Md., Oct. 22, and re-elected John M. Hood President of each company for the ensuing year. George H. Baer was also re-elected Secretary and Treasurer. This is Gen. Hood's eighteenth term as President of the Western Maryland.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Alleghany & Kinzua.—The company has about 200 men at work on the grading for an extension from Bradford to Lumber Mills, a distance of about 10 miles. The work is in progress on six miles of this distance. About eight miles of the line will be located in Pennsylvania. The survey has been made for about 20 miles. The maximum grades are 187 ft. per mile and the maximum curves 19 degrees.

Atchison, Topeka & Santa Fe.—The company proposes to open on Nov. 16 a new line between Chicago and St. Louis. The trains will run from Chicago to Pekin over the Atchison road, thence to Sorrento over the Jacksonville Southeastern line, and into St. Louis over the Toledo, St. Louis & Kansas City and Merchant's Bridge Terminal road. The new line is 333 miles long, against 282 by the Chicago & Alton, 286 by the Wabash and 289 by the Illinois Central.

Barre.—It is thought that the new branch line from Graniteville to East Barre, Vt., a distance of about one and one-half miles, is to be built. The route has already been surveyed, to estimate the cost, and East Barre people have subscribed \$3,000 toward the project.

Beaver & Ellwood.—This road has been built and opened for traffic between the new town of Ellwood and a point on the Pennsylvania and Pittsburgh & Lake Erie near Rocky Point, Pa., about three miles.

Burlington & Missouri River.—It is proposed to grade about 100 miles of road beyond Merino, Wyo., this year, on the extensions from near Cheyenne, to a point about 50 miles south of Buffalo in the northwestern part of the state. The rails will probably reach Merino before the close of the year. On the extension of the Grand Island & Wyoming Central, through South Dakota, 44.5 miles of track has been put down since June between Edgemont and Custer, S. D. On the Grand Island & Northern Wyoming, the track has reached a point 30 miles northwest from Newcastle.

Calgary & Edmonton.—North of Calgary 35 miles of track has been laid and about 60 miles of grading completed. One hundred miles of track will probably be finished this season, and about 130 miles of grading.

Cape Fear & Cincinnati.—The construction company organized to build this road has sublet the contract for the first 150 miles to Keating & Co., of Ohio. The contract includes the grading, trestling and tracklaying. This division has been located and it is stated that construction will be commenced next week. There will be five iron bridges with an aggregate length of about 1,600 ft. There will be no heavy work on this division. It will be built with maximum grade of 30 ft. per mile and curves of from three to four degrees. It is claimed that the company has arranged to secure funds for that part of the line which has been put under contract.

Carson & Colorado.—An extension of this California road is being built through Douglas County from Hawthorne southwest to Wood Camp, about 10 miles distant. When the branch has been built for this length it will probably be continued about 10 miles further to reach other lumber lands.

Cheyenne & Northern.—The grading of the extension from Wendover north has been completed to Fisher, Wyo., the junction of the Chicago & Northwestern. The tracklaying was commenced about Oct. 6, and it will be finished before Nov. 1.

Chicago, Kansas City & Texas.—The extension of this road from its present terminus will probably be resumed shortly. It is claimed that the company has secured sufficient funds to complete the road from the terminus, at Smithville, 20 miles north of Kansas City, to the Iowa state line, at Caineville, a distance of 150 miles.

Chicago, St. Paul, Minneapolis & Omaha.—The company expects to complete the grading this month on the extension of its Randolph branch from Randolph, Neb., north about 21 miles. The first track will probably be laid this week. The maximum grade on the extension is 1.2 per cent., and the maximum curves two degrees.

On the branch from Neillsville westerly to Marshfield, Wis., about 13 miles of track has been laid. The entire grading has not yet been completed, but probably will be by Nov. 1. The branch is about 24 miles long. It has a grade of .8 per cent. and a curvature of three degrees.

Columbus, Shawnee & Hocking.—The connection between the main line and the Shawnee & Muskingum division has been completed from Saltillo to Sayre, O., about 12 miles. The line has been opened and the trains of the road have been transferred from the Cincinnati & Muskingum Valley road, which has been paid a rental for the use of its tracks to make the connection.

Duluth, Red Wing & Southern.—The officers of the Duluth Construction Co., which has the contract for building this road, claim that grading will be resumed at Zumbrota, Minn., in a few weeks. It is proposed to complete 40 miles of the line this year.

Dutchess County.—The company has dismissed the entire force engaged in building the road between Poughkeepsie and Hopewell Junction, N. Y., 12 miles, and all work has been suspended. The cause of this action has not been published.

East & West of Alabama.—The company has completed the changing of its tracks to standard gauge. The work has been in progress since last year. Through trains have been running about a week on the new gauge between Pell City, Ala., and Cartersville, Ga., 117 miles. During the work many of the steeper grades were reduced and much other work of that character was done.

Emmetsburgh & Des Moines.—A charter has been obtained for this company in Iowa. It is projected by local citizens and is to extend from Emmetsburgh south to Havelock, Pocahontas and to Fonda, where it will connect with the Des Moines & Northwestern, giving a direct route to Des Moines. A survey has been made and a township tax has also been voted. E. S. Ormsby is President. George Fairburn, of Des Moines, is one of the directors.

Grand Rapids, Chicago & St. Louis.—A. E. Allison & Co., of St. Paul, Minn., have been awarded the contract for grading this road between Grand Rapids and Benton Harbor, Mich., about 84 miles.

Great Northern.—One of the engineers reports that work is progressing satisfactorily on the line westward from Fort Assinaboine, Mont. About 25 miles of the extension has been completed west of that point, and the contractors are increasing their force of men so as to complete the 103 miles to the summit of the mountains before being compelled to quit work for the winter. The grading along the whole line is pretty well advanced, but tracklaying has not made much progress. In regard to the pass to be adopted as a route through the Cascade Mountains, he said that all the passes available had been examined, but that a final choice would not be made until next year. They all required tunnels ranging in length from one to three miles, but the strata was such as to make a good solid roof and walls. The ascent of the mountains from the east is made with a grade nowhere exceeding one per cent. The line strikes across the outlying minor ridges, instead of following the watercourses to their head, as has been done heretofore in railroad building in that country.

Houston, Central Arkansas & Northern.—The contractors expect to have the grading from the station grounds at Alexandria, La., north to the Red River ready in a little over a month. Besides the work in progress from Alexandria, a large force is pushing south from Riverton, near Columbia. The possible delay in the construction of the three bridges across Red, Ouachita and Little rivers is the only thing that will keep the contractors, Henry, Forrest & Co., of St. Louis, from completing the road according to contract by Jan. 1 next, but they will certainly have connection with St. Louis by Feb. 1.

Hudson Suspension Bridge & New England.—The New York, Ontario & Western has entered into an agreement with this company, by which, if the latter company completes its bridge over the Hudson River before July, 1897, and constructs a branch road to a connection with the Ontario & Western near Meadowbrook, the Ontario & Western will operate the branch and pay as an annual rental a sum equal to six per cent. of the cost of construction of the connection, if earned, provided the cost does not exceed the sum of \$250,000; the company also agrees to pay the taxes and expenses of maintenance of the connecting line, which will be about eight miles long, extending from the west side of the bridge approach, near the Bull Hill tunnel to the connection with the Ontario & Western, near the Newburgh branch of the New York, Lake Erie & Western. A contract has already been made between the bridge company and the New York & New England.

Kearney & Black Hills.—The contractors for building this railroad, Wood & Bancroft, of Omaha, have completed it from Kearney northwest to Callaway, Neb., a distance of about 65 miles. The line connects with the Union Pacific, and it will probably be operated by that company.

La Salle Belt.—Some of the business men of La Salle, Ill., propose to build a belt road about the town, from the zinc works at one end to the stations of the Chicago, Rock Island & Pacific, and Chicago, Burlington & Quincy.

Le Mars & Western.—A corps of surveyors have begun the survey of the road projected by this recently organized company. The route is from Kingsley, northwest, via Le Mars, Ia., and thence to the state line and toward Yankton, S. D. The expenses of the survey are being borne by shippers of Le Mars and Kingsley. The

engineering work is in charge of a Mr. Beems, formerly with the Chicago, St. Paul & Kansas City.

Magnolia & Southern.—The directors of the company filed articles of incorporation with the Secretary of State at Little Rock, Ark., on Oct. 13. The capital stock is \$200,000. The road will be constructed from Magnolia to a point between Arkansas and Louisiana, a distance of 25 miles. T. J. Elmore is President and E. Elmore General Manager. The office will be at Magnolia.

Mahoning Valley.—This company has been incorporated in Pennsylvania this week with a capital stock of \$450,000. The road is to extend from Punxsutawney, Jefferson County, to Clearfield, with a branch beginning near Stanley, Pa., and extending to Falls Creek Junction, in Clearfield County. The length of road will be 42 miles. J. A. Haskell, of Delancey, Pa., is President.

Michigan Central.—A contract has been awarded to John M. Lally, of Detroit, Mich., to construct a 12-mile extension of the Hampton Branch. This is a logging road from the main line at West Branch and extending 12 miles into the Hampton district pine land. The contractors will put 200 men and 75 teams on the work.

A preliminary survey is being made for a line from Bay City northwesterly about 25 miles to Sebawaing, Mich., where new coal fields are reported to have been discovered. Nothing will be decided regarding the building of the line for some time, nor until the estimates of the engineers regarding the cost of the line and the probable traffic have been worked out.

Middle & East Tennessee.—Nearly all the grading of this road, which is to extend from Gallatin to Hartsville, Tenn., has been completed, and in a few weeks the rails will be put down. J. C. Rodemer & Co., the contractors, hope to have the line in operation by Jan. 1. The connection with the Chesapeake & Nashville is at Rogana, near Gallatin. There is a good deal of trestling not yet completed.

Mobile & Girard.—The directors met at Columbus, Ga., recently and voted to issue a mortgage on the extension from Troy to Brewton, Ala., at the rate of \$12-700 per mile. The Van Kirk Land & Construction Co., which is grading and laying the cross ties on the extension between Troy and Andalusia, Ala., 51 miles, are pushing the work rapidly. The firm has let the grading to Worthington, Elliot & De Bardeleben, of Birmingham. The contractors have on the work about 400 men and 275 scrapers. The maximum grade is 52.8 ft. per mile. There will be perhaps two iron bridges and one trestle, about 4,000 ft. long. The track will be laid by the Central of Georgia. For its work on the extension the land company receives the unsold lands of the railroad. These are covered with yellow timber of excellent quality. W. J. Van Kirk, of Montgomery, is President of the construction company.

Montgomery, Tuscaloosa & Memphis.—The grading has been entirely completed between Montgomery and Maplesville, Ala., 50 miles, and about 20 per cent. of the earthwork between Maplesville and Tuscaloosa has also been finished. The location to Tuscaloosa has been completed for some time, and grading is going ahead all along this division of 107 miles. The work is comparatively easy. The grades are 1.25 per cent. and curves six degrees. There are three iron bridges, over the Alabama, Cahaba and Black Warrior rivers—800 ft., 200 ft. and 525 ft. long respectively. There is quite a large amount of trestling. From Montgomery the road passes through Prattville, 15 miles; Maplesville, 50 miles; Centerville, 72 miles; to Tuscaloosa, 107 miles. From Tuscaloosa westward the line has not been surveyed, but it will probably extend to Artesia, Miss., 150 miles west of Tuscaloosa. This will be the next division put under construction. James M. Brown & Co., of 115 Broadway, New York, are the general contractors for the entire work. The earthwork has been sublet to Dean, Berry, Boehmer & Co., of St. Louis. Their temporary address is Tuscaloosa.

New Albany, Belt & Terminal Co.—Tracklaying on this road has been in progress several weeks. Work was commenced near the tracks of the Ohio & Mississippi at West street, New Albany, Ind., and the track has been laid beyond Vincennes street. It is also being laid south of the Jeffersonville, Madison & Indianapolis track. The iron and steel for the trestlework has not yet been received, but is expected daily. Piles are being driven along the river front, east of Third street, and below that point stone piers are being erected. The road will give the Ohio & Mississippi and the Louisville, Evansville & St. Louis a connection with the Kentucky & Indiana Bridge.

New Orleans, Port Jackson & Grand Isle.—The road has been extended from Myrtle to Magnolia, La., on the Mississippi River, and trains are running regularly to that point, about 37 miles from Algiers. The line will be finished to Socola's canal within a week, and to Port Jackson within the next 60 days. The Grand Isle branch will be ready by April 1 next. All materials are on hand, but work is somewhat retarded by scarcity of labor.

New Roads.—Work is rapidly progressing on the new road from the Raleigh & Augusta Air Line to Egypt, in Chatham County, N. Y. There are about 200 convicts doing the grading. The road branches from the Raleigh & Augusta near Sanford and will run near the coal mines and brownstone quarry of the Egypt Coal Co., which is building the line.

A survey is being made for a new road on Whidby Island, near Seattle, back across Skagit Bay, through La Conner, and up the Skagit River as far as Sank City, Wash., a distance of 68 miles.

New York Central & Hudson River.—The company will probably carry out some important improvements on its line between Syracuse and Buffalo next year. Some of the steep grades on the divisions between Syracuse and Rochester and between Rochester and Buffalo will be reduced and a number of curves eliminated. The freight trains will then be able to dispense with pushing engines on all the grades.

Norfolk & Western.—Very good progress is being made with the grading and masonry upon the Ohio extension. The company has as yet been unable to commence tracklaying, and will not get much of the track down until about the first of the year, after which time the contractors expect to prosecute it vigorously from each end. The work of grading and masonry may be said to be four-tenths done at the present, but some heavy cuts at each end of the line will prevent tracklaying until finished. On the Clinch Valley extension to meet the Louisville & Nashville at Norton, Va., the work of grading is now nearly completed, only a little remaining to be done near the west end. The company is now erecting a trestle, the necessary materials for which

have been delivered. This trestle will be finished in about 20 days, when it is expected to lay track uninterruptedly to Norton, reaching that point in December.

Qu'Appelle, Long Lake & Saskatchewan.—The inspection of this road between Regina and Prince Albert, by the Canadian Pacific, has been completed and that company has accepted the line from the contractors and has commenced its operation. The land subsidy voted by Parliament has been paid over to the company.

St. Louis, Collinsville & Carondelet Belt Line.—This company filed its articles of incorporation in Illinois last week to build a road from Collinsville, Madison County, to Carondelet. The capital stock is \$2,000,000.

St. Louis & Superior Terminal.—The company has applied to the government for a patent. It proposes to build a road from a point on the south shore of the St. Louis River, opposite Fond du Lac, Minn., through St. Louis to a point on St. Louis Bay, near the main line of the Northern Pacific, and also from some point on the line to South Superior, and thence to a point on the Bay of Superior where the Newago River flows into the bay.

Saratoga & St. Lawrence.—The directors of the company, at a recent meeting at Moira, N. Y., authorized the extension from Bombay north about eight miles to Hogsburgh, N. Y., on the St. Lawrence River. The right of way has been secured, but it is not likely that the extension will be completed before next spring.

Satsop.—The company has about ten miles of new road surveyed in Mason County, Wash., and partly graded, and is awaiting the arrival of the sailing vessel with the rails, from England, before tracklaying will be commenced.

Seattle & Northern.—All the rails for the seven or eight miles of this road between Sedro and Hamilton, Wash., have been delivered at Anacortes, the Western terminus, and most of the material has been forwarded to the end of track. Probably within two weeks the line will be open to Hamilton.

Shelbyville & Monroe.—A number of the residents of Shelbyville, Mo., are organizing a company for the purpose of building a road from Monroe northwest to Shelbyville, about 30 miles, connecting the Hannibal & St. Joseph and Missouri, Kansas & Texas roads. A survey will doubtless soon be made between the two points by T. M. Long, of St. Joseph.

Stevenson, Sand Mountain & Dalton.—The company has filed with the Secretary of State of Alabama memoranda of two surveys that have been made. One is from Birmingham to Bridgeport, Ala., to be 102 miles in length. The other is from Stevenson, Ala., east, through New England City, to Dalton, a distance of 50 miles.

Tavares & Gulf.—The extension from Waits Junction south to Black Lake, Fla., is being pushed, and a large force is grading. An increased number of men may soon be put on the work.

Texas & Pacific.—The extension of the Thibodaux branch to Lafourche, La., about five miles, has been postponed for the present. The reasons assigned are that trouble concerning the right of way has been encountered which may carry the matter into the courts. The road will very likely be built in the spring, with the possibility of extension to Labadieville and to Napoleonville.

Union Pacific.—The Maxwell branch has been completed and trains are making trips between Trinidad and the new town of Catskill, Col., in the Red River Valley, 30 miles distant. The branch takes its course up a steep grade, and reaches a summit 2,000 ft. higher, almost, than its beginning. It runs through Sopris, Martinson and Pels. The extension is about 15 miles long.

Vancouver, Klickitat & Yakima.—The road has been extended four miles further eastward, making about 20 miles constructed. The road is now in a fine lumber region in the heart of the Cascade range, and is heading for Klickitat pass. The contract has been let for building the second 12 miles of the road. This will bring it to the head of the Lewis River. The first section is being operated profitably.

Wilmington, Chadbourne & Conway.—The company proposes to commence tracklaying this week on the extension which is being built from its northern terminus, N. C., northwest, a distance of about 11 miles, to the Lumber River, where it will reach the mills of the Enterprise Land & Lumber Co. The grading is in progress by a force of about 200 men, under the direction of the chief engineer. The line will be built on a tangent with maximum grades of 26 ft. per mile. It is expected to have it ready for operation by Dec. 15.

Yadkin.—About 800 laborers are at work on the grading of this road in Stanly County, N. C., and by spring the road will be complete from Salisbury via Albemarle to Norwood, near the Pee Dee and Rocky rivers, a distance of 41 miles.

GENERAL RAILROAD NEWS.

Chicago & Erie.—In the Circuit Court at Wabash, Oct. 22, Judge Conner made his ruling on the application of the Wabash for a temporary injunction restraining the above road from refusing to permit the running of the trains of the Niagara Falls Short Line on its tracks between Laketon Junction and Hammond, Ind. The Court held that under the Indiana law a lease is valid if it is not absolute. There was no proof that the business of the Chicago & Erie had been interfered with, and the breaking up of the through line would entail loss to the Wabash. Evidence had been submitted to show that the Wabash had a lease and a bond ample to save the Chicago & Erie. He enjoined the latter from interfering with Wabash traffic until the case is heard formally in January.

Flint & Pere Marquette.—The Circuit Court at Flint, Mich., has been petitioned by this company to grant it authority to discontinue the operation of 12 miles of track of the Black River division of the Port Huron & Northwestern between Zion and Yale, Mich. When the road between Port Huron and Saginaw was changed to standard gauge the line was shortened and the route altered to give a better line to the St. Clair Tunnel. This rendered the line between Yale and Zion of little value. The results of the last three months' operations show that the earnings have been \$977 and the expenses \$3,000.

Lehigh Valley.—The annual report of the road for the last fiscal year shows that the gross earnings of the road during the year were \$13,950,759; operating ex-

penses, \$10,481,823; net earnings, \$3,468,636. The operating expenses include \$6,785,000 paid in wages to 13,267 employees. The capital stock outstanding is \$40,441,310, and it is held by 18,267 persons.

New York, Ontario & Western.—The company has issued a brief preliminary statement to the stockholders, anticipating the regular report of the directors. The results of operation of the road for the fiscal year ended June 30, 1890, show: Gross earnings, \$1,963,756; operating expenses, \$1,506,015; taxes, \$74,984; net earnings, \$366,756; fixed charges, \$223,314; surplus, \$146,442. The report for the fiscal year ended June 30, in detail, compared with the previous year, shows:

	1890.	1889.	Inc.
Gross.....	\$1,963,756	\$1,740,713	\$223,043
Net.....	366,756	267,851	101,905
Surplus.....	146,441	62,645	83,796

For the first quarter of the fiscal year ended Sept. 30, which embraces the first three months' operations of the new Scranton extension, the results are as follows, expenses for September being estimated: Gross receipts, including \$18,750 of interest on bonds of the Ontario, Carbondale & Scranton, \$780,354; expenses, \$496,997; taxes, \$38,839; net income, \$244,518; charges, \$149,628; surplus, \$94,890. The item of fixed charges, \$149,628, comprises: Interest on funded debt, \$103,791; sundry interest, \$4,061; rental of Scranton division, \$22,087; rental of Utica division, \$18,750; rental of Wharton Valley road, \$937. The coal traffic over the Scranton branch has increased to 40,000 tons per month, which is all that the line can move until the Weehawken trestle is completed.

Northern Pacific.—At the annual meeting in New York last week, the Board of Directors ratified the agreement entered into on April 1 by the Chicago & Northern Pacific, the Wisconsin Central Company, and the Wisconsin Central Railroad. The board also adopted a resolution requesting the new board to continue to set apart the earnings of this year due the preferred stock in consolidated bonds at 85, and to take into consideration at the earliest date the question of increasing the regular annual dividend on the preferred stock above four per cent. now paid, or of declaring an extra dividend; the increase above four per cent. or the extra dividend to be paid from the reserve fund, set apart for the benefit of the preferred stock. President Oakes says in his report that by the acquisition of the Puget Sound Shore road the Northern Pacific secures an important line between Tacoma and Seattle, and by a connection with the Seattle, Lake Shore & Eastern (now controlled in the Northern Pacific interest) it will afford a line along the Sound to the Canadian boundary. The Central Washington gives access to a rich part of Washington known as the Big Bend country, and will probably in time be extended to the Okanogan mining region. The Rocky Fork & Cooke City line opens to the Northern Pacific important coal fields.

Pullman's Palace Car Co.—The annual statement read at the recent stockholders' meeting gave the following figures: Revenue: Earnings of cars, \$7,473,136; patents, \$11,624; manufacturing, rentals, dividends, interest, etc., \$1,376,201; total, \$8,860,961. Disbursements: Operating expenses, \$3,274,605; paid car associations operated by the company, \$1,022,625; interest on bonds, \$65,600; dividends, \$2,000,000; reserve, \$100,000; total, \$6,462,230. Surplus for the year, \$2,398,731.

President Pullman gave the following general information: During the fiscal year contracts have been renewed for a period of 25 years with the following companies: Louisville, Evansville & St. Louis Consolidated, Rio Grande Western, Cincinnati, Hamilton & Dayton, Denver & Rio Grande, and New York & New England. New contracts have been made for a similar period with the following: Central New England & Western, Pennsylvania, Poughkeepsie & Boston, Florida Central & Peninsular, Chicago & Eastern Illinois, Evansville & Terre Haute, and Old Colony. The company has also assumed the management of the bulk of the tourist car business of the Northern Pacific. There have been built and placed in service during the year 101 cars, costing \$1,365,503, or an average of \$13,520 per car. Orders have been placed at the company's works for 119 Pullman cars, the estimated cost being about \$16,500 each, or an aggregate of \$1,963,500. The number of cars employed in the service is 2,135, of which 286 are tourist, or second class cars. The number of passengers carried during the year was 5,023,057; the number of miles run, 177,033, 116. During the previous year the number of passengers carried was 4,242,542, the number of miles run 144,842,618. The increase is a little over 18 per cent., both in the number of passengers carried and miles run. The total mileage of roads covered by contracts for the operation of the cars of this company is now 120,686 miles—a net increase of about 3,000 miles during the year. There has been added during the fiscal year to the company's investments in shops and plant, \$52,435. The value of manufactured product of the car works of the company for the year was \$8,105,431, and of other industries, including rentals, \$2,108,226, making a total of \$10,213,657, against \$10,388,164 for the previous year. The average number of names on the pay-rolls at Pullman for the year was 4,582, and wages paid, \$2,733,019, making an average of each person employed of \$596, against \$579 for the previous year. The total number of persons in the employ of the company in its manufacturing and operating departments is 12,367; wages paid during the year, \$6,249,891. The number of employees for the previous year was 11,063, and wages paid \$5,770,345. The population of Pullman, as shown by the census of July 31, 1890, is 10,680 persons, as against 10,610 in the previous year; 1,985 employees are living outside of Pullman, but in its immediate vicinity.

St. Louis, Alton & Springfield.—On application to the Circuit Court at Springfield, Ill., Oct. 20, by Johnson Bros. & Faught, contractors, this road was placed in the hands of Joseph Dickson, of St. Louis, as Receiver. The company owes the firm \$78,000. The total indebtedness is about \$1,000,000. The actual management of the road, however, will remain the same for the present. The application for a Receiver is part of a general reorganization scheme. Post, Martin & Co., of New York, control the road.

St. Louis, Arkansas & Texas.—The Missouri & Arkansas Division of the road, extending from Bird's Point, Mo., opposite Cairo, Ill., to Texarkana, Ark., with its branches and other properties, was sold at St. Louis, on Oct. 20, under decree of the Federal Court given last July to the Mercantile Trust Co. and the Central Trust Co. of New York. It was purchased by the Reorganization Committee, Gen. Louis Fitzgerald, President of the former company, being the bidder, for \$6,000,000. The Texas Division was sold under a similar decree at Waco, Tex., Oct. 20, and bid in by the same parties. The sale was made under a foreclosure upon a first mortgage for

\$5,277,000 given to the Central Trust Co. of New York, May, 1888, and of second mortgages given to the Central and the Mercantile Trust companies for nearly equal amounts.

Union Pacific.—The earnings of the different roads in the system of the entire line for August are given in the following table:

OREGON SHORT LINE & UTAH NORTHERN.			
August:	1890.	1889.	Inc. or dec.
Mileage.....	1,399	1,396	I. 3
Gross earnings.....	\$266,631	\$619,049	I. \$43,582
Oper. expenses.....	382,286	335,893	I. 46,393
Net earnings.....	\$280,345	\$283,156	D. \$2,811
Since Jan. 1:			
Gross earnings.....	\$4,885,459	\$4,128,250	I. \$757,209
Oper. expenses.....	3,166,200	2,310,871	I. 855,329
Net earnings.....	\$1,719,259	\$1,817,379	D. \$98,120

OREGON RAILWAY & NAVIGATION.			
August:	1890.	1889.	Inc. or dec.
Mileage.....	1,029	901	I. 128
Gross earnings.....	\$156,226	\$385,952	I. \$77,726
Oper. expenses.....	389,317	247,055	I. 142,262
Net earnings.....	\$69,909	\$138,897	D. \$71,988
Since Jan. 1:			
Gross earnings.....	\$2,787,139	\$2,737,584	I. \$49,555
Oper. expenses.....	2,520,627	1,574,341	I. 946,286
Net earnings.....	\$266,512	\$883,543	D. \$617,031

UNION PACIFIC, DENVER & GULF.			
August:	1890.	1889.	Inc. or dec.
Mileage.....	1,386	1,385	I. 1
Gross earnings.....	\$500,363	\$426,107	I. \$74,256
Oper. expenses.....	344,638	276,753	I. 67,885
Net earnings.....	\$164,725	\$149,354	I. \$15,371
Since Jan. 1:			
Gross earnings.....	\$3,675,971	\$2,824,020	I. \$851,951
Oper. expenses.....	2,551,941	2,198,138	I. 353,803
Net earnings.....	\$1,123,730	\$625,882	I. \$497,848

WHOLE UNION PACIFIC SYSTEM.			
August:	1890.	1889.	Inc. or dec.
Mileage.....	8,028	7,865	I. 163
Gross earnings.....	\$3,984,369	\$3,919,819	I. \$64,550
Oper. expenses.....	2,507,253	2,161,192	I. 346,101
Net earnings.....	\$1,477,076	\$1,758,627	D. \$281,551
Since Jan. 1:			
Gross earnings.....	\$28,649,639	\$24,909,119	I. \$3,740,520
Oper. expenses.....	19,502,561	15,809,215	I. 3,693,346
Net earnings.....	\$9,147,078	\$9,109,904	D. \$37,174

President Adams is now in the West examining the property. He is reported as writing that the road is now in condition to haul the season's wheat, now moving, at satisfactory rates. Better returns from the Oregon Railway & Navigation Co. divisions are looked for, and if rates were as sure to be as satisfactory on the whole system as in Oregon and Washington the outlook for the company would be relatively bright. The coal traffic promises a large development. The connection with the Chicago & Northwestern road through the Cheyenne & Northern extension, nearly completed, likewise promises well. The straightening of the Utah & Northern road between Ogden and McCammon, Idaho, and the broadening of the gauge has involved an outlay of about \$1,800,000. The alterations have shortened the distance between Ogden and McCammon from 130 to 111 miles. Some 9 miles of entirely new main line has been built and the grade reduced from a maximum of 119 ft. to 52 ft. to the mile. Eight narrow-gauge cars were a load over the former high grade. Twenty-five standard gauge cars or more can be hauled over the new grade. Sixty-pound rails have been substituted for 35 to 40 lb. steel and iron rails. The lumber and other freight from the far North to Salt Lake will now take the short line instead of the long one by the way of Granger, and to the exceeding advantage of the main line between Granger and Ogden, which is a good deal crowded.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Oct. 22, 1890.

While no decisive action was taken at the meetings last week, yet preliminary steps were taken looking towards what is hoped will afford a solution of the perplexing questions with which the Western roads have been struggling for so long. At the meeting of the Western Freight Association the Alton insisted that it would put into effect its notice reducing the hard coal rate to Kansas City from \$3.20 to \$1.50 per ton, and the lumber rate to the same point from 15 to 10 cents per 100 lbs. Such action would have resulted in demoralizing the coal and lumber rates of the entire territory west of the Mississippi River. At a conference of Southwestern lines held Oct. 16, the Alton suspended action under its notices, and the agreement of July 30 will now be allowed to run during the 90 days fixed for its duration. On and after Nov. 1 any line can give 30 days' notice of withdrawal. The meeting of Oct. 16 also considered the plan proposed by Chairman Walker in his circular to the Presidents, for the establishment of joint Eastern agencies. Chairman Midgley also strongly urged the adoption of such an arrangement, and showed its practicability from his experience in the satisfactory working of a similar plan several years ago. Chairmen Faithorn, Goddard and Finley concurred fully. Further action will be had at an adjourned meeting to be held Oct. 28.

Neither the Western and Northwestern division of the Western Freight Association or the Trans-Missouri Freight Association elected successors to Messrs. Faithorn and Finley. The affairs of the former were placed in the hands of Chief Clerk Osgood, and Chief Clerk McFadden will remain in charge of the latter until the meetings next month.

The Western Passenger Association has voted to withdraw the second-class rate of \$9 between Chicago and St. Paul and Minneapolis Nov. 1. This is done to stop manipulation in the market by scalpers of these tickets to meet the competition of the "Soo" line on New York business.

The result of Chairman Finley's new departure in attempting to control the sale of the "harvest excursion" tickets will be looked for with interest. The lines agreed that on the close of sales, Oct. 14, a statement of all sales in Chicago and St. Louis should be filed with the chairman, also statements of tickets issued on exchange orders. The chairman is empowered to take charge of the ticket collections of going and returning coupons for 30 days from Oct. 14; he may purchase at Chicago or St. Louis portions of such tickets which he may find disturbing the established tariff rates, and the roads agree to redeem them at cost; and he may bring charges against any road whose collections show coupons in excess of the sales and exchanges submitted.

The Western Freight Association has resolved that it will adopt uniform classification Jan. 1, provided all the other associations do, and provided the State Commissions agree to it.

Chairmen Goddard and Faithorn will assume the duties of their new positions Nov. 1.

The Western Freight Association yesterday agreed to advance the westbound Chicago-St. Paul freight rates from the present tariff, which is on a basis of 50 cents first class, to 60 cents, 50, 38, 23, 17, 23, 17, 15, 13 and 12 cents respectively on the several classes. This is to go into effect Nov. 17.

Traffic Notes

The railroads handling grain at Kansas City have agreed to weigh carloads both when they come in and when they are sent out from that city. Heretofore through cars have been weighed only by the road on which they arrived.

A movement is on foot to form an Eastern Passenger Association to cover New England territory, filling a place similar to those occupied by the Trunk Line, the Western Passenger, Central Traffic, and other associations in their respective territories.

The failure of the Texas & Pacific to put up bulletin boards announcing the time of the arrival and departure of trains, and, if not running on schedule time, the hours or minutes they are late, as is required by the law that went into effect Aug. 2, has impelled the district attorney at Shreveport, La., to enter suit for \$42,000.

During the week ending Oct. 4, on the occasion of the celebration, at Pawtucket, R. I., of the centenary of cotton manufacturing in the United States, the New York, Providence & Boston carried 150,000 passengers between Providence and Pawtucket. The average number of trains was 105 per day. On Wednesday trains averaged one every 7½ minutes.

The State of Louisiana having passed a law requiring separate accommodations on passenger trains for white and black passengers, the Southern Pacific has partitioned its cars, dividing them so as to give the negroes about one-third of the space. Many of these cars run about 400 miles in Texas, where no such separation is required, causing considerable comment.

The Interstate Commerce Commission, on Oct. 20, decided in favor of the defendants in the case of the Poughkeepsie Iron Co. against the Boston & Albany, the New York Central & Hudson River and the Connecticut River roads, involving relative rates on pig iron from Poughkeepsie, N. Y., and Youngstown and Cleveland, O., to New England points; and also relative rates from Poughkeepsie and other furnaces in the State of New York to New England points.

The case of General Passenger Agent D. B. Martin, of the "Big Four," charged with giving passes to influence traffic, has been referred by the United States District Court at Cleveland to the Interstate Commerce Commission. Two officers from the Auditor's Department, who, with Martin, had been reported to the grand jury, refused to produce documents, and were held for contempt of court, but they also were handed over to the Interstate Commerce Commission.

Decision Ordering Equal Rates on Live Hogs and Packing House Products.

The Interstate Commerce Commission, in the case of the Board of Trade of Chicago, complainants, against the Chicago & Alton and seven other roads, defendants, and the Armour Packing Co. and 18 other packing companies, and the Board of Railroad Commissioners of the state of Iowa, as intervenors, has decided in favor of the Board of Trade of Chicago. Opinion by Bragg, Commissioner. The Commission orders the defendant carriers to make the same rates on live hogs as on packing house products from Missouri River points and interior points in the states of Iowa and Missouri to Chicago within four weeks from the date of the order. Rates are now, and long have been, the same upon those commodities from Missouri River points and interior points in the states of Iowa and Missouri to Mississippi River points and to Eastern seaboard cities, markets and packing houses generally, except to Chicago. The Commission decides that this discrimination against Chicago is unjust, and a violation of Section 3 of the Act to Regulate Commerce.

The defendants claimed that the rate on live hogs should be higher, because: 1. The time is faster; the evidence does not warrant this claim. 2. Greater risk; this is not proved. 3. Higher cost; this is not proved. 4. The other roads which carry cheaper use double double-deck cars; this is no justification for the discrimination. The intervenors claim that packing houses at the Missouri River would have to be shut up, but this argument was not accepted. The roads argued that the general business created by the existence of packing houses at their western termini warranted them in making concessions to keep such establishments running; this was not admitted as a warrant for discrimination against Chicago. It was shown that live hogs shrink 3 to 5 per cent. in transportation, but this point was deemed unworthy of notice.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Oct. 18, amounted to 67,363 tons, against 71,025 tons during the preceding week, a decrease of 3,662 tons, and against 63,755 tons during the corresponding week of 1889, an increase of 3,608 tons. The proportions carried by each road were:

	W'k to Oct. 18.		W'k to Oct. 11.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	8,057	11.9	7,165	10.1
Wabash.....	3,650	4.7	3,389	4.7
Lake Shore & Michigan South.....	10,211	15.1	11,363	16.0
Pitts., Ft. Wayne & Chicago.....	6,906	10.2	6,494	9.1
Chicago, St. Louis & Pitts.....	10,169	15.5	14,197	20.0
Baltimore & Ohio.....	4,322	6.4	2,914	4.1
Chicago & Grand Trunk.....	8,262	12.4	9,735	13.7
New York, Chic. & St. Louis.....	9,269	13.8	7,876	11.1
Chicago & Atlantic.....	6,717	10.0	7,962	11.2
Total.....	67,363	100.0	71,025	100.0

Of the above shipments 1,755 tons were flour, 30,003 tons grain, 1,695 tons millstuffs, 4,970 tons cured meats, 2,238 tons lard, 8,567 tons dressed beef, 1,399 tons butter, 1,733 tons hides, 301 tons wool, and 6,570 tons lumber. The three Vanderbilt lines together carried 40.8 per cent., while the two Pennsylvania lines carried 25.7 per cent. During the week the lake lines carried 77,950 tons, against 37,507 tons during the preceding week. Of the shipments 7,400 tons were flour and 59,025 tons grain.